K. Merriman

THE NATURE ENCYCLOPEDIA

AMERICAN HOLLY

THE NATURE ENCYCLOPEDIA

EDITED BY
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Prepared under the auspices of
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KNOWING THE TREES

By JOSEPH S. ILLICK

I love thee when thy swelling buds appear,
And one by one their tender leaves unfold,
As if they knew that warmer suns were near,
Nor longer sought to hide from winter's cold;
And when with darker growth thy leaves are seen
To veil from view the early robin's nest,
I love to lie beneath thy waving screen,
With limbs by summer's heat and toil oppressed;

And when the autumn winds have stripped thee bare,
And round thee lies the smooth, untrodden snow,
When naught is thine that made thee once so fair,
I love to watch thy shadowy form below,
And through thy leafless arms to look above
On stars that brighter beam when most we need their care.

—Jones Very

FOREWORD

TREES are among the commonest and most conspicuous objects of nature. Next to the grasses, which comprise about 3,000 distinct species, trees are the most widely distributed and best known members of the whole vegetable kingdom. They are found in every land, and occur in a great variety of situations. As vanguards of the forest they stand on the shores of the ocean, battling with the mighty waves and compelling winds. They stand as outposts along the border of dreary deserts, and contend with the destructive forces of nature along the timber line on our high mountain slopes. They beautify the banks of placid streams, and protect their shores against raging torrents. They frame the home picture, and give thereto an expression of homeliness and comfort. They furnish a protective cover to steep mountain slopes, and thus help in the checking of erosion and in the prevention of destructive floods.

Furthermore, they yield many of the most essential and indispensable commodities which man uses in time of peace and in waging war. A prominent military authority stated that the planted forests of France were a powerful factor in checking, and finally stopping, the German offensive in the recent world war. Many military units sought shelter in dense forest stands, and used the branches of trees to camouflage batteries, and employed every piece of available timber in constructive work. The forest played an important part in both the offensive and defensive operations of the army, and its products played an even greater rôle during the recon-

struction period, for thousands of homes and other essential structures have been built.

Wood will forever be a human need. We cannot get along without it. It is an essential from the cradle to the coffin. But unfortunately our available supply is waning rapidly, and something must be done to offset this destructive tendency. It is imperative that we begin immediately to build up our forests with valuable trees, and thus offset the destructive work of the wasteful lumbering methods of the past.

The first and most essential step in this building-up process is the protection of all existing growth from destructive agencies. Forest fires have been the curse of our forests ever since the days of the early pioneer. Fire usually followed in the wake of lumbering operations, and left areas of desolation where once stood matchless miles of untouched primeval timber.

The original forest of North America covered an aggregate area of 850,000,000 acres, consisting chiefly of dense and very productive stands. Our present forests are small, open, and very unproductive. Each generation of mankind has seen a smaller, more open, and less productive generation of forests. It is not a prophecy, but the statement of a fact, when we say that the source of our timber supply is becoming a real vital economic question. Fast-vanishing forests and ever-rising lumber prices are couriers of this fact.

These extensive stretches of unproductive land cannot remain. It is an economic crime to allow thousands of acres of land capable of producing valuable and much-needed forests to remain idle. They must be restocked with valuable forest trees. Nature will do much in restoring forests, upon devastated areas, but its methods are uncertain, and its work, as a rule, progresses slowly. Man is capable of giving much assistance to nature by directing its forces and supplementing them wherever they are too weak.

The planting of trees is one of the most practical and economical methods of helping nature. The first quarter of the twentieth century will go down in the annals of American forestry as the "Age of Forest Tree Planting." Forest trees are now being planted everywhere for a great many purposes. They are being set out as fitting and lasting memorials to those who made "the supreme sacrifice" in the recent world war. One can find them along streets, highways, waterways, and by-ways, in parks and playgrounds, on lawns and estates, and within privately and publicly owned forests. Many communities have developed Roads of Remembrance, established Memorial Parks, and set out Tribute and Memorial Trees. Thousands of trees are planted annually to reforest watersheds, barren mountain slopes and vacant corners. During the past twenty years fifty million forest trees have been planted within the State of Pennsylvania, and an increasing number will be set out in the future.

Our friendship with trees is at first passive, but upon learning their interesting habits, unique behaviors, and many uses more fully, the friendship develops into a passionate love of them. As one becomes acquainted with them he soon finds that they differ from each other just as each human being differs from all others, and yet there are types and families of trees just as there are nations and races among men.

There are more than 500 different species of trees native to North America, but less than 100 of them can be classified as important timber trees. Some of them are being used extensively for ornamental planting, and a few are propagated for the fruit which they yield.

There follows a description and discussion of eighty common trees, and in the comparative discussions of distinguishing characteristics at least fifty additional kinds are considered. If one learns to know these representative trees, little difficulty should be experienced in identifying all the important groups of American trees, and the knowledge acquired will be of much

value in making homes more beautiful, towns more attractive, and States more productive.

Let every American boy and his father *plant trees, plant love for trees,* and *plant knowledge concerning trees!* All three are commendable practices, but the greatest of them is knowledge concerning trees, for he who really knows them will likely plant them and love them too.

Unless otherwise credited, the sketches of trees in the following pages are from "Trees of Pennsylvania."

He who plants a tree
Plants a joy;
Plants a comfort that will never cloy.
Every day a fresh reality
Beautiful and strong,
To whose shelter throng
Creatures blithe with song.
If thou couldst but know, thou happy tree,
Of the bliss that shall inhabit thee!

He who plants a tree
He plants love.
Tents of coolness spreading out above
Wayfarers he may not live to see.
Gifts that grow are best;
Hands that bless are blest;
Plant: Life does the rest!
Heaven and earth help him who plants a tree,
And his work its own reward shall be.

—Lucy Larcom.

THE PINE FAMILY

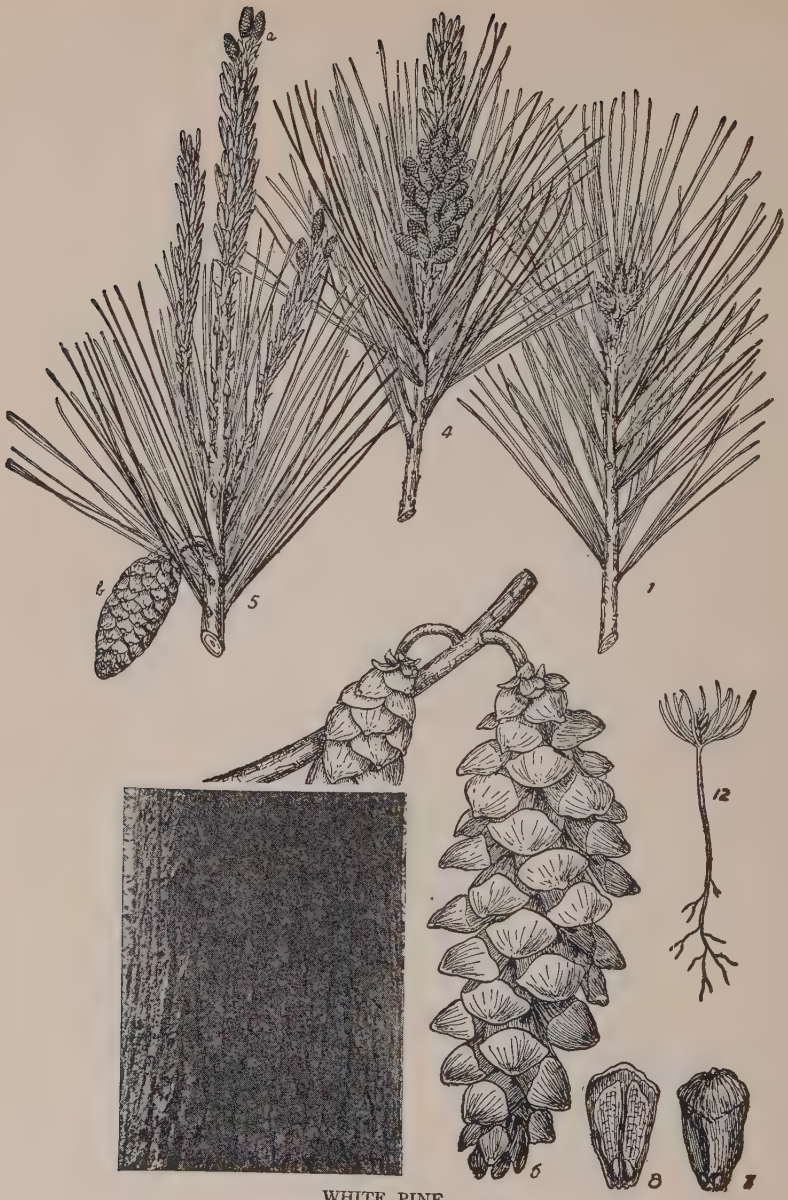
PINACEÆ

THE Pine Family comprises thirty-four different groups of trees and shrubs with a total membership of about 300 distinct species. All the members of this family are collectively known as conifers. The evergreen habit is characteristic of most of them, the Larches and the Bald Cypresses being the only native groups which are entirely devoid of foliage during the winter months.

The Pine Family is of special economic importance on account of the many commercial products which are derived from it, and the wide range of characteristics and habits which its members possess. Their leaves are usually awl-shaped, scale-shaped, or needle-like, and their fruit is a woody cone, ranging in size from that of a small cherry to a football. The wood of its members differs markedly from that of broad-leaved trees in its great uniformity, less conspicuous figure, and absence of pores. Some representatives yield large quantities of resin, tar, pitch, and turpentine, all of which are important articles of commerce.

The principal North American groups of trees belonging to the Pine Family are:

Common Name	Scientific Name
1. The Pines.	Pinus.
2. The Larches.	Larix.
3. The Spruces.	Picea.
4. The False Firs.	Pseudotsuga.
5. The True Firs.	Abies.



WHITE PINE

6. The Hemlocks.	Tsuga.
7. The Arbor Vitæs.	Thuya.
8. The Cedars.	Chamaecyparis.
9. The Sequoias.	Sequoia.
10. The Bald Cypresses.	Taxodium.
11. The Incense Cedars.	Heyderia.
12. The Junipers.	Juniperus.

White Pine

Pinus strobus *Linnæus*

Family.—Pine.

Other Name.—Soft Pine.

General Description.—*Shape:* pyramidal to conical; in dense stands, crowns shallow and broad. *Height:* 50 to 90, sometimes 125 feet. *Bark:* on old trunks thick, dark gray, deeply furrowed; on young trunks thin, smooth, greenish-brown. *Buds:* egg-shaped, sharp-pointed, ¼ of an inch long, clustered at the end of twigs. *Leaves:* bluish-green, soft, flexible, needle-like, about 5 inches long, occur *in clusters of five*. *Flowers:* appear about May; pollen-bearing, yellow, oval, about ¼ of an inch long; seed-bearing, pinkish-purple, cylindrical, about 1/3 of an inch long. *Fruit:* a drooping and short-stalked cone 5 to 8 inches long.

Preferred Habitat.—Moist, fertile, and well-drained soil.

Range.—Newfoundland to Manitoba, south through Pennsylvania to Georgia, and southwest to Iowa.

The White Pine may be recognized without much effort. It is the only evergreen tree native to eastern North America which has its soft, flexible and bluish-green needles arranged *in clusters of five*. The lateral branches are arranged in distinct horizontal layers, from three to seven of them occurring in a whorl. After the branches fall off they leave distinct circles of branch traces along the trunks. The cones are 5 to 10 inches long, bear a short stalk, and are covered with thin, flat, and unarmed scales.

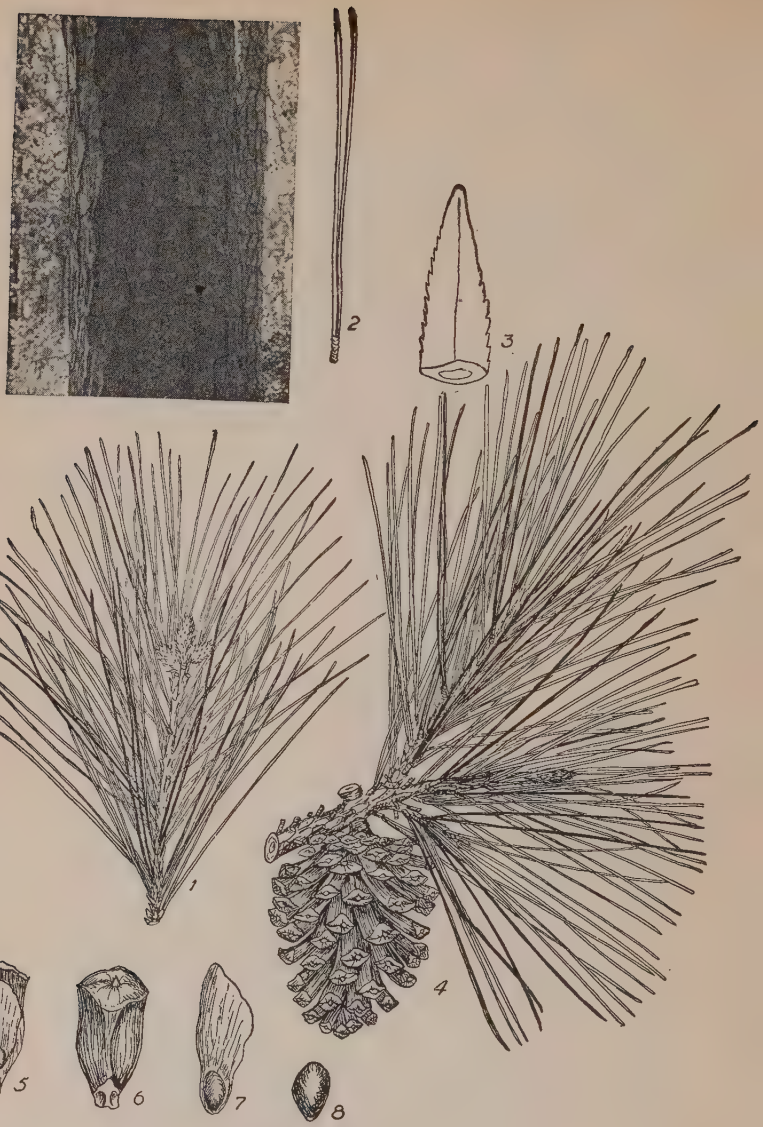
The wood is soft, straight-grained, and works easily. It weighs about 25 pounds per cubic foot, and was formerly used for a wider range of purposes than any other American wood.

Only a few tracts of virgin White Pine remain in the world. A trip to these remaining samples of nature's supreme accomplishment in tree development is well worth while, for the pleasure derived from looking at these monarchs of the forest is indescribable.

The White Pine is the most important forest tree in eastern North America, and probably in the world. It adapts itself to a great variety of soils, grows rapidly, produces valuable wood, and is ornamental.

---

1 = Branch with needles and terminal cluster of buds; 4 = branch with staminate flowers; 5 = branch with (a) pistillate flowers on new growth, (b) one-year-old cone on last season's growth; 6 = branches with an open cone; 7 = lower side of a cone scale; 8 = upper side of a cone scale with two winged seeds; 12 = a seedling



SHORT-LEAF PINE

1 = Branch with needles and terminal cluster of buds; 2 = a cluster of two needles; 3 = tip of a needle with finely serrate margin, enlarged; 4 = branch with needles and an open cone; 5 = upper side of a cone scale with two winged seeds; 6 = lower side of a cone scale; 7 = a winged seed, natural size; 8 = a seed, slightly enlarged

Short-Leaf Pine

Pinus echinata *Miller*

Family.—Pine.

Other Names.—Yellow Pine; Rosemary Pine; North Carolina Pine; Pitch Pine.

General Description.—*Shape:* tall, clean, slightly tapering trunk bearing a shallow, broad, round-topped crown. *Height:* 80 to 100, sometimes 120 feet. *Bark:* on old trunks dark brown, tinged with cinnamon red, thick, broken by furrows forming rectangular scaly plates. *Leaves:* needle-like, slender, flexible, dark bluish-green, 3 to 4 inches long; arranged in clusters of two, sometimes three. *Flowers:* appear during April and May; pollen-bearing, pale purple to yellow, oval, about ¼ of an inch long; seed-bearing, pale rose-colored, cylindrical, 1/3 of an inch long. *Fruit:* a short-stalked or sessile egg-shaped cone, 1½ to 2½ inches long.

Preferred Habitat.—Plains and foothills. Common on poor, sandy, and clayey soil.

Range.—Southeastern New York and northern Pennsylvania to Florida, Illinois, Kansas, and Texas.

The Short-leaf Pine has the widest distribution of the thirty-four different pines native to North America. Its botanical range covers more than 440,000 square miles, and in at least two-thirds of this area it is of commercial importance. It extends from sea level to an altitude of 3,000 feet in the Southern Appalachians, but reaches its best development on the plains and foothills between 400 and 1,500 feet.

This tree has at least a dozen local common names. The name Short-leaf Pine, however, fits it best, for its leaves are indeed short and slender. They are 3 to 5 inches long, and that is very short in comparison with those of the Long-leaf Pine, which vary in length from 12 to 18 inches. As a rule, two needles occur in a cluster, but occasionally one may find three or even four in a bundle. Its clean, stately, and slightly tapering trunk, the bark of which is marked off by deep furrows into irregular or rectangular plates covered with thin scales, is a very positive means of identification. The cones are conical in shape when closed, and bear numerous brown scales, terminated by weak prickles. They are about 2 inches long, persist for two or more years, and yield a large quantity of seed. A pound of seed comprises 50,000 to 65,000 separate seeds, which should produce about 30,000 seedlings, if planted carefully and tended properly in a nursery.

It grows fairly rapidly, is easily propagated, thrives on a wide range of soils, endures extreme climatic conditions, and yields valuable timber and naval stores. Turpentine, rosin, charcoal, tar, and pine oil are some of the important by-products derived from this tree. Much of our strong wrapping paper is also manufactured from paper pulp derived from it.

Courtesy of U. S. Forest Service

WESTERN YELLOW PINE
a = Leaf

Western Yellow Pine

Pinus ponderosa *Lawson*

Family.—Pine.

Other Names.—Yellow Pine; Bull Pine.

General Description.—*Shape:* massive, straight-trunked tree bearing a long narrow crown. *Height:* 125 to 140, sometimes 200 feet, with a diameter from 3 to 8 feet. *Age:* 300 to 500 years. *Bark:* on old trunks thick, russet-red, marked by broad shield-like plates, covered with concave scales. *Leaves:* needle-like, deep yellow-green, 5 to 11 inches long, occur in bundles of 3. *Flowers:* appear about May; pollen-bearing clustered at base of new growth, and seed-bearing occur in small groups along new growth. *Fruit:* a grass-green to purple cone, 3 to 6 inches long, 1½ to 2 inches wide, covered with russet-brown and shiny cone scales.

Preferred Habitat.—Dry, well-drained, sandy, or gravelly soils.

Range.—Dakotas northwest to the Canadian line, south to Lower California and New Mexico, and along the mountains to Central Mexico.

The Western Yellow Pine has the widest distribution of the twenty-four different kinds of pine native to the western part of the United States. It has no less than fourteen common names, and to call it Western Yellow Pine is in entire harmony with its range and characteristics. The specific part of its scientific name—ponderosa—is eminently fitting, for it is indeed a ponderous tree, being surpassed in size only by the majestic Sugar Pine. Exceptionally large trees reach a height of 175 to 200 feet, and attain an age of 350 to 500 years.

This tree has such striking characteristics that it can be recognized easily at all seasons of the year. The trunk is massive and straight, and bears a narrow conical crown composed of huge bent branches. The needles are 4 to 11 inches long and occur three in a bundle. The branches are stout, stiff, and if broken, give off a strong odor of orange. The cones vary in length from 3 to 6 inches, mature early in August of the second season, and range in color from greenish to dark purple.

It is botanically classified as a Hard Pine, but its wood is intermediate between that of the White Pines and the Hard Pines of the South. The wood is rather heavy, hard, and strong It weighs about 30 pounds per cubic foot, and is used for heavy construction work, railroad ties, telegraph poles, mine timbers, and other similar uses.

AMERICAN LARCH

American Larch

LARIX LARICINA (*Du Roi*) *Koch*

FAMILY.—Pine.

OTHER NAMES.—Larch; Tamarack; Hackmatack; Black Larch.

GENERAL DESCRIPTION.—*Shape:* conical to pyramidal. *Height:* 30 to 40, sometimes 90 feet. *Bark:* on branches smooth, thin, bluish-gray; on old trunks close-fitting, roughened by small, thin, roundish, reddish-brown scales. *Twigs:* slender, dull brown, covered with numerous, short, stout, spur-like lateral branches. *Buds:* small, smooth, shiny, round, about 2/5 of an inch across, occur at end of spur-like lateral branches. *Leaves:* needle-like, ¾ to 1½ inch long, persist only during one season; occur singly on terminal shoots, and are clustered on lateral spurs of branches. *Flowers:* appear about May; pollen-bearing, stalkless, yellow, and almost round; seed-bearing, short-stalked, reddish and oblong. *Fruit:* an egg-shaped light brown cone, about 2/5 of an inch long, and composed of approximately 12 scales.

PREFERRED HABITAT.—Cold swamps and wet places.

RANGE.—A transcontinental species extending from Newfoundland south to Pennsylvania, and west through Minnesota and British Columbia to Alaska.

THE American Larch stands out prominently among its associates because it sheds all its leaves each autumn. On the approach of winter the leaves become pale yellow and fall to the ground.

The leaves of the American Larch are flat, soft, slender, and about one inch long. On the twigs of the last season they occur singly, while on the spurs of older twigs they are found in dense clusters of ten or more.

The cones are among the smallest produced by any American conifer. They average only about 2/5 of an inch in length and bear approximately twelve scales, upon which the tiny winged seeds are produced. The mature cones often persist upon the trees for many years.

In winter the glossy brown twigs, entirely devoid of any foliage and covered with numerous stubby lateral spurs, are positive means of identification. The characteristic reddish-brown bark on the older trunks, often broken up into small roundish scales, is also very characteristic.

The American Larch is the only tree which occurs from Newfoundland across the entire continent to Alaska, and extends beyond the Arctic Circle to the limit of tree growth. Throughout this wide range it meets with a great diversity of climatic conditions, and each varied habitat seems to stamp it with some peculiarity. It prefers cold bogs, swamps, and other wet places, but also thrives on well-drained hillsides.

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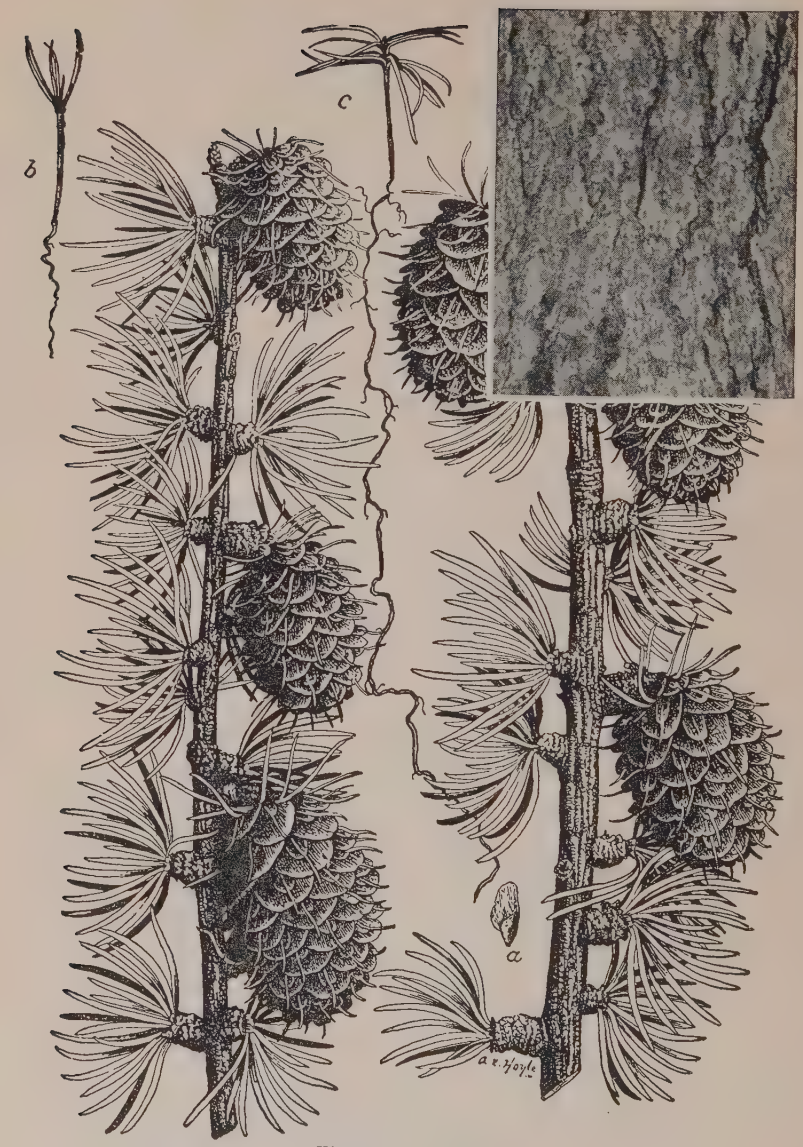
1 = Branch with developing leaves and flowers; 2 = branch with needles (clustered and solitary) and fruit; 3 = cone scale with two winged seeds, enlarged; 4 = a winged seed, enlarged; 5 = a seed, enlarged; 6 = a seedling, enlarged; 9 = a winter branch with lateral spurs; 10 = a cone of European Larch (*Larix decidua*); 11 = leaf of European Larch; 12 = cross-section of European Larch, enlarged

Courtesy of U. S. Forest Service



WESTERN LARCH

a = Upper side of seed with wing; b = seedling two weeks old; c = seedling six weeks old

Western Larch

LARIX OCCIDENTALIS *Nuttall*

FAMILY.—Pine.

OTHER NAMES.—Western Tamarack; Tamarack; Red American Larch.

GENERAL DESCRIPTION.—*Shape:* crown narrow, short, pyramid-like, running up to slender point. *Height:* 100 to 180, sometimes 200 feet, with a diameter of 5 to 8 feet. *Bark:* reddish cinnamon-brown, 3 to 6 inches thick, deeply furrowed. *Leaves:* flatly triangular, 1 to 2 inches long, occur solitary on new growth, and in clusters of 14 to 30 needles on older twigs. *Fruit:* a cone 1 to 1 ½ inch long, matures in one year, falls by October or November.

PREFERRED HABITAT.—North and west exposures, stream bottoms, valleys, and flats.

RANGE.—Southeastern British Columbia, northwestern Montana, northern Idaho, Washington and southward to Oregon.

THE Western Larch is a tree of far greater economic importance than the Eastern Larch, in spite of its restricted range. It is seldom found less than 2,000 or more than 7,000 feet above sea level, and within this altitude occurs on a wide range of situations, from wet ground to dry mountain sides.

That it is a larch, is its best distinguishing characteristic. This means that it sheds all its leaves each autumn, and that the leaves, which are a trifle longer than those of the Eastern Larch, occur singly on the twigs of the last season's growth and in dense clusters on the older growth.

While the bark of the Eastern Larch is thin, that of mature specimens of Western Larch is often 4 to 6 inches thick and deeply furrowed. The cones of the Western Larch are 1 to 1¼ inch long, while those of the Eastern Larch rarely exceed 2/5 of an inch in length, and are covered with a coat of white woolly hairs.

The Western Larch is one of the big trees of the West, for it frequently exceeds 150 feet in height and occasionally reaches 200 feet. It is the largest and most massive of the North American Larches.

It belongs to the group of long-lived trees, for it ordinarily reaches an age of 300–500 years, and some of the larger specimens are probably 600 to 700 years old.

Courtesy of U. S. Forest Service

AIRPLANE SPRUCE

Airplane Spruce

Picea sitchensis *Carriere*

Family.—Pine.

Other Names.—Sitka Spruce; Tideland Spruce; Western Spruce; Giant Spruce; Alaska Spruce; Silver Spruce.

General Description.—*Shape:* conical and narrow topped. *Height:* 125 to 150, sometimes 270 feet, with an occasional diameter of 15 feet. *Bark:* reddish-brown in color, up to 1 inch thick, broken into thin, irregular, loose, round scales. *Leaves:* straight stiff, flat, ¼ to ½ of an inch long, blunt-pointed, stand out in all directions from twigs. *Flowers:* pollen-bearing, darkish red, cylindrical in form, seed-bearing, about 1 inch long, oblong in form. *Fruit:* a shiny reddish-brown cone from 2 to 4 inches long.

Preferred Habitat.—Swampy or moist land and mild climate.

Range.—Alaska, along the coast southward to California.

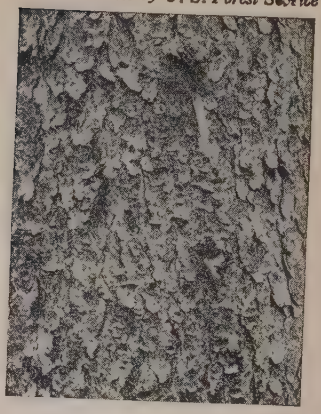
The giant among the North American Spruces is a tree now known as Airplane Spruce. It acquired this name during the great World War, because it furnished large quantities of unsurpassed wood, used in the construction of airplanes. Before the war, this tree was known as Tideland Spruce, and locally as Sitka Spruce.

The moist climate of the north Pacific slope is its favorite home. There it reaches a diameter of six to ten feet, and a height of 150 to 200 feet is very common. Exceptional specimens reach a height of more than 250 feet, and exceed twelve feet in diameter. When grown in dense stands the trunks are tall and straight, have a moderate taper, and yield valuable saw timber free from knots.

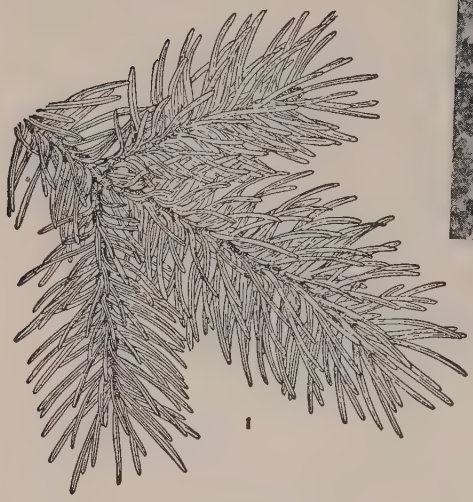
Only the choicest portion of selected trees is fit for use in the construction of airplanes. The length, elasticity, and toughness of the wood fiber are the qualities which recommend it for airplane construction, rather than the strength of the wood. It has other uses than airplane construction, for large quantities are used annually in the manufacture of paper pulp and sounding boards. Playground apparatus, household utensils, and poultry equipment are some additional common uses.

The Airplane or Tideland Spruce may be distinguished at any season of the year. Its large, clean trunks covered with thin, scaly, reddish-brown are distinctive. The first glance at a twig gives one the impression of a spruce. A close examination of the needles will show that they are straight and stiff, just as the other spruces, but differ from them in being flat instead of four-sided. The cones are reddish-brown in color and two to four inches long. All the eastern and most western spruces have smaller cones. The thin and jaggy cone-scales are also a very helpful means of identification.

Photo by U. S. Forest Service



WHITE SPRUCE



1

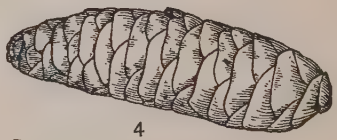
3

1 = Winter branchlet; 2 = leaves; 3 = cross-section of leaf, enlarged; 4 = unopened cone; 5 =partly opened cone; 6 = cone-scale with seeds

6

2

5



4

Drawing from "Trees of Vermont"

White Spruce

Picea canadensis (*Mill.*) *BSP.*

Family.—Pine.

Other Names.—Labrador Spruce; Cat Spruce; Skunk Spruce.

General Description.—*Shape:* a medium-sized tree with straight, slowly tapering trunk, bearing a broad-based pyramidal crown. *Height:* 40 to 60, sometimes 80 feet, with a diameter of 2 feet. *Bark:* grayish to pale reddish-brown, slightly roughened with small scales. *Buds:* ovate, blunt-pointed, light-brown. *Leaves:* bluish-green, 4-angled, about ½ inch long, sharp-pointed; give forth a rank odor if bruised. *Flowers:* appear during April and May; pollen-bearing, oblong-cylindrical; ½ to ¾ of an inch long; fruit-producing, oblong-cylindrical, pale red or yellowish-green; about 1 inch long. *Fruit:* an oblong-cylindrical cone, 1½ to 2½ inches long, covered with thin, flexible, smooth-margined scales.

Preferred Habitat.—Low, damp, but not wet, situations; also found on dry, sandy soils and high, rocky slopes and exposed hilltops.

Range.—A transcontinental tree extending from Quebec and Ontario to Manitoba, British Columbia and Alaska, and to within 20 miles of the Arctic Sea.

The White Spruce is one of the most magnificent evergreen trees native to North America. When grown in the open it develops a beautiful symmetrical form and is densely clothed with branches from tip to base.

It is generally regarded as an Eastern forest tree, but it is actually a transcontinental tree, for it extends almost across the entire width of the country from the Atlantic to the Pacific, and reaches northward to within 20 miles of the Arctic Sea.

If one examines its branches closely, this tree may be separated readily from the Red Spruce and the Black Spruce, with which it is commonly associated, for its twigs are smooth, that is, hairs are entirely lacking upon them, while those of the Red Spruce and the Black Spruce are thickly covered with short hairs. It may also be distinguished by the fact that its leaves when bruised have an unpleasant odor, which has given it the name of Skunk Spruce and Cat Spruce. Its cones are also larger than those of the Black and Red Spruce.

The best foresters of Canada and the Northeast claim that White Spruce will in time become the principal forest tree grown upon vast areas used primarily for the production of pulpwood.

Courtesy of U. S. Forest Service

DOUGLAS FIR

Douglas Fir

Pseudotsuga taxifolia (*Poir.*) *Britton*

Family.—Pine.

Other Names.—Douglas Spruce; Red Fir; Yellow Fir; Oregon Pine.

General Description.—*Shape:* broad, sharp-pointed, pyramidal. *Height:* 150 to 180, sometimes 200 feet, with a diameter from 3½ to 10 feet. *Bark:* dark brown on the outside, reddish-brown within, roughened by deep furrows, often very thick. *Buds:* conical, sharp-pointed, covered with numerous overlapping reddish-brown scales. *Leaves:* straight, flat, acute to obtuse at apex, yellowish-green, about 1 inch long and 1/12 of an inch wide. *Fruit:* a drooping cone 2 to 4 inches long, with numerous reddish-brown cone-scales and conspicuous reflexed bracts.

Preferred Habitat.—Occurs on a wide range of sites from moist sea coast to dry mountain slopes.

Range.—Rocky Mountain region of the United States, northward to central British Columbia; on the coast region, from central California to southern Alaska.

The Douglas Fir is one of the giant trees of the West. Next to the Redwoods, it is the largest tree native to the United States. The tallest specimen on record attained a height of 380 feet. A few trees reached a diameter of fifteen feet, and one tree was felled which scaled 60,000 board feet of lumber.

The cones are the most distinctive feature of the tree. They are from two to four inches long and have a feathered appearance. This unusual appearance is due to the bracts which project about one-half inch beyond the cone scales. No other American cone-bearer possesses this characteristic so evidently.

In winter the buds enable the observer to identify the Douglas Fir. They are sharp-pointed, conical, and covered with numerous bright reddish-brown scales. The buds located at the ends of the twigs are approximately one-fourth of an inch long. The numerous buds found along the side of the twigs are somewhat shorter and blunter.

The bark is a helpful means of identification at all seasons of the year. It is dark-brown on the outside and reddish-brown within. Sometimes the bark becomes eighteen inches thick, and is roughened by deep furrows running up and down along the trunk.

The wood is heavy, hard, strong, coarse-grained, and rather difficult to work. No other single wood in the world equals the cut of Douglas Fir. It is used extensively in this country, and exported to every civilized country in the world.

HEMLOCK

1 = Branch with needles and staminate flowers; 2 = branch with needles and pistillate flowers; 3 = branch with needles and mature cones; 4 = a cone scale with two winged seeds, natural size; 5 = a winged seed, natural size; 6 = a seed, enlarged; 7 = leafless branch with buds, enlarged; 8 = a seedling, natural size

Hemlock

Tsuga canadensis (*L.*) *Carriere*

Family.—Pine.

Other Names.—Hemlock Spruce; Spruce Pine; Canadian Hemlock.

General Description.—*Shape:* conical and symmetrical. *Height:* 60 to 80, sometimes over 100 feet. *Bark:* grayish to reddish-brown, roughened by long shallow furrows; inner bark is cinnamon-red. *Leaves:* linear, flat, ½ of an inch long, rounded or notched at apex, borne on short stalks, dark green and glossy above, pale green on lower surface, and marked with two white lines. *Flowers:* appear during April or May; pollen-bearing, globular, yellow, about ¼ of an inch in diameter; seed-bearing, oblong and pale green. *Fruit:* a small short-stalked cone about ¾ of an inch long.

Preferred Habitat.—Banks of streams, borders of lakes, ponds, and swamps.

Range.—Nova Scotia to Minnesota, south to Pennsylvania, and along the mountains to Alabama.

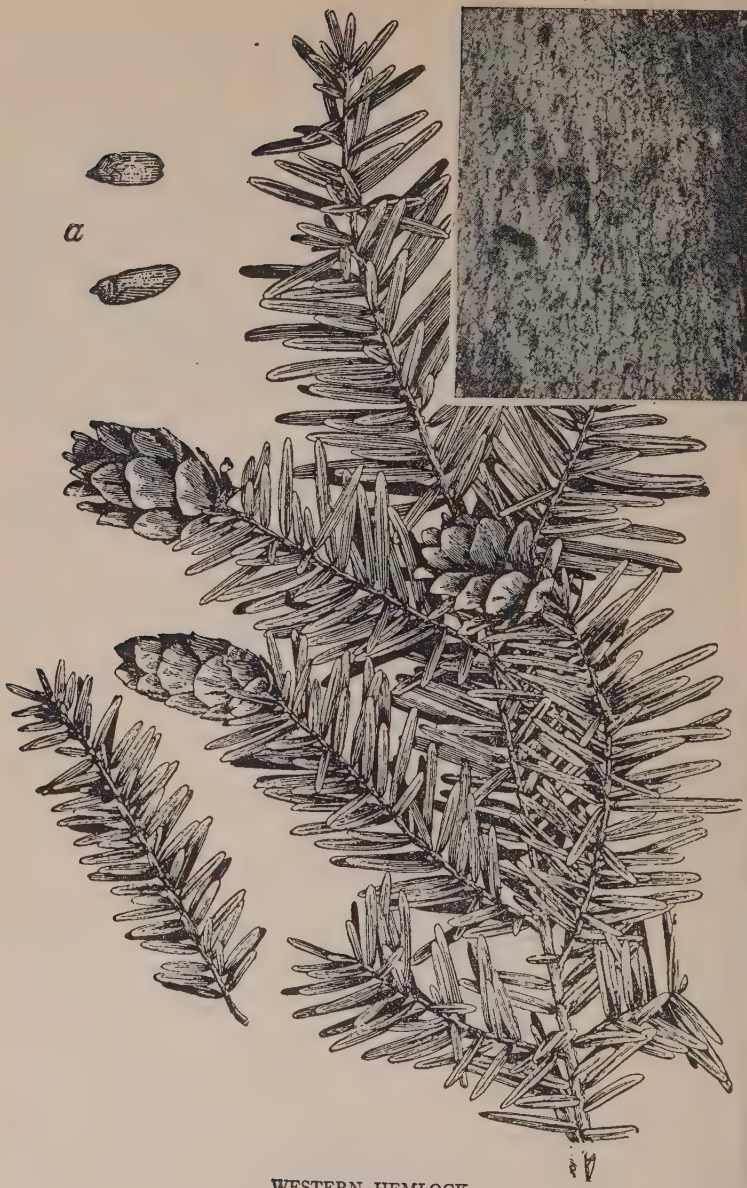
Hemlock trees may be recognized by their small flat leaves with two white stripes on the lower surface. The needle-like leaves are jointed to short woody stalks, and are arranged in two flat rows alongside the twigs. There is a third and rather inconspicuous row of small leaves on the top of the twigs extending in the same direction as the twigs.

The cones are short-stalked, about three-quarters of an inch long, grow on the tip of the twigs, and often persist throughout the winter. The wood is hard, weak, brittle, liable to splinter, and difficult to work. It is used chiefly for rough construction work, coarse lumber, paper pulp, boxes, crates, and laths.

The Hemlock may be distinguished at all seasons of the year by its distinctive bark, which is usually reddish-brown, and scaly to furrowed on the outside, and rich cinnamon-red within. If one takes a pocket-knife and bores through the bark, and finds a rich cinnamon-red inner bark, he is in possession of a positive distinguishing characteristic of the Hemlock.

As an ornamental tree the common eastern Hemlock has no equal among the American evergreen trees. In form it somewhat resembles the Spruces, but its slender, pliant, and irregularly distributed twigs covered with small flattened leaves give it an unusually pleasing and graceful appearance, which is equaled by only a few, and surpassed by no other cone-bearing tree.

Courtesy of U. S. Forest Service



WESTERN HEMLOCK

a = Seeds with wings

Western Hemlock

TSUGA HETEROPHYLLA (*Raf.*) *Sargent*

FAMILY.—Pine.

OTHER NAMES.—Hemlock Spruce; Hemlock; Alaska Pine.

GENERAL DESCRIPTION.—*Shape:* crown small, narrowly pyramidal, composed of slender branches which droop in open-grown specimens. *Height:* 125 to 160 feet with a diameter of 2 to 5 feet. *Bark:* on young trees thin, finely scaly, russet-brown; on old trunks 1 to 1½ inch thick, hard, deeply furrowed, dark russet-brown. *Leaves:* deep glossy green, flat, grooved above, rounded at end, ¼ to 7/8 of an inch long, with a thread-like stem. *Fruit:* a small, few-scaled cone ¾ to 1¼ inch long, matures latter part of August and falls during winter.

PREFERRED HABITAT.—Moist situations from sea level to 7,000 feet elevation.

RANGE.—Pacific Coast region, from Alaska to northern California, inland to southern British Columbia, northern Idaho and the Cascades of Oregon and Washington.

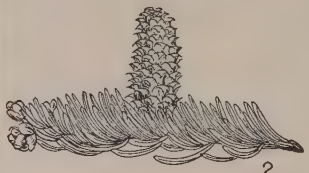
THE Western Hemlock is a large forest tree. It frequently reaches a height of 125 feet and a diameter of 4 feet. Many of the large trees are from 300 to 500 years old.

Its tall, clean, smooth-looking trunks, fine foliage, and drooping branchlets make it easy to distinguish this tree from its associates. It is much larger than the Eastern Hemlock, and also produces somewhat larger cones, which are short-stalked.

The leaves are flat, rounded at the end, about ¼ to 7/8 of an inch long and borne on a thread-like stalk. They clothe the twigs thickly, but on account of their small size give a thin appearance to the crown of the tree.

The wood of the Western Hemlock is light, soft, fine-grained, and works like soft pine, and the bark yields a larger percentage of tannin than the Eastern Hemlock so extensively used for tanning.

It seems reasonable to predict that Western Hemlock will play an important rôle in the future of forestry in the West.



BALSAM FIR

1 = Branch with needles and staminate flowers; 2 = branch with needles and pistillate flowers; 3 = branch with needles, three cones and one cone axis from which the scales have fallen; 4 = a cone scale with two winged seeds, natural size; 5 = a winged seed, slightly enlarged; 6 = a seed, enlarged; 7 = leafless branch with buds, slightly enlarged; 8 = a seedling

Balsam Fir

Abies balsamea (*L.*) *Miller*

Family.—Pine.

Other Names.—Fir; Balsam; Blister Pine.

General Description.—*Shape:* conical and symmetrical. *Height:* 30 to 50, sometimes 100 feet. *Bark:* on old trunks reddish-brown, somewhat scaly; on young trunks smooth, thin, grayish-brown, and marked with projecting resin blisters. *Buds:* clustered at end of twigs, egg-shaped to round, covered with very glossy, varnished orange-green scales. *Leaves:* flat, blunt-pointed, stalkless, about 1 inch long, dark green on upper surface, pale green with two white lines on lower surface, apparently arranged in two flat lateral rows. *Flowers:* appear during May or June; pollen-bearing, yellow, about ¼ of an inch long; seed-bearing, purple, about 1 inch long. *Fruit:* an erect cylindrical, dark purple to brown cone, from 2 to 4 inches long; cones mature in one season, and scales fall off, leaving a bare central axis.

Preferred Habitat.—Swamps and other wet places.

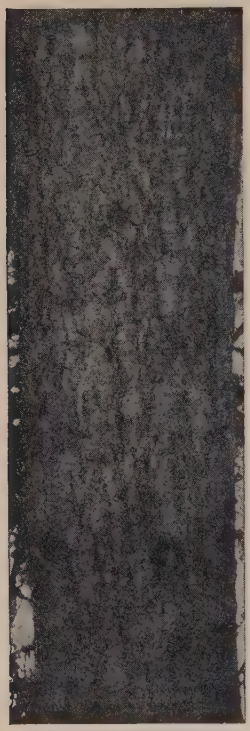
Range.—Labrador south through the mountains of Pennsylvania to Virginia, west to Alberta and Minnesota.

The Balsam Fir, which is one of the most beautiful evergreen trees native to North America, is essentially a tree of the Northwoods, where it frequents bogs, swamps, and other wet places.

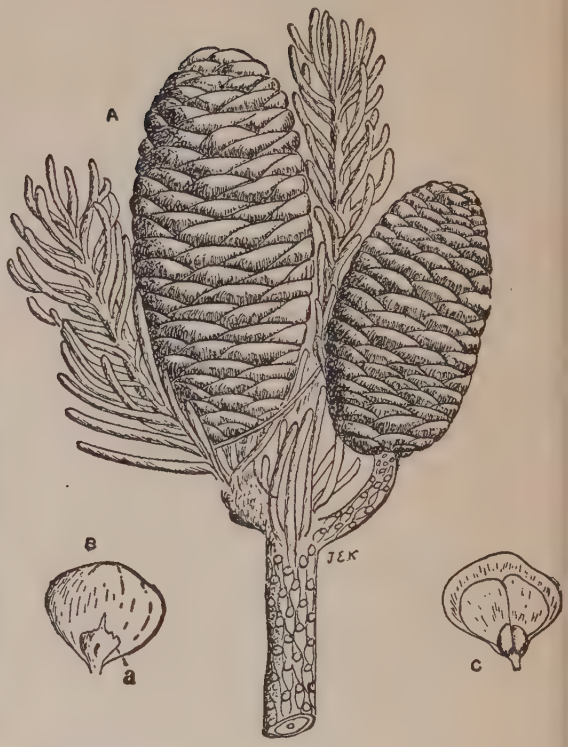
A mere glance at a Balsam Fir tree is usually sufficient to distinguish it from any other eastern tree. The leaves are flat, stalkless, deep green on the upper surface, and pale green with two white lines on the lower side. It is a common practice in the Northwoods to collect large quantities of leaves and use them in filling pillows and cushions, for the leaves, when dried, emit a very fragrant, balsamic odor. The grayish-brown, smooth bark, marked with projecting blister-like swellings, is a positive means of identifying this tree. Upon puncturing one of these blisters, a clear balsam flows forth. The buds are egg-shaped to round in outline, about one-sixth of an inch long, clustered at the end of the twigs, and covered with glossy orange-green scales. The cones are from two to four inches long, cylindrical in form, and stand erect on the twigs. Their cone scales fall off soon after they mature and leave a bare central axis.

Most people who have lived or visited in the regions where the Balsam Fir grows have a distinct and lasting impression of its appearance. It is the king among our Christmas trees, for it has an attractive form, dense crown, and beautiful foliage.

Photo by U. S. Forest Service



Courtesy of the U. S. Dept. of the Interior



ALPINE FIR

A = Twig and cone in natural position; B = bract, at a, and lower side of seed-bearing scale; c = upper side of seed-bearing scale with seeds in position

Alpine Fir

Abies lasiocarpa (*Hook.*) *Nuttall*

Family.—Pine.

Other Names.—Balsam; White Fir; White Balsam.

General Description.—*Shape:* crown long, narrowly conical; trunk short. *Height:* may reach 60 to 90 feet; often less than 10 feet, but occasional specimens reach 130 feet. *Bark:* thin, hard, flinty, ashy-gray, often chalky-white, usually smooth. *Leaves:* deep blue-green with a silvery tinge, flat, pointless, 1 to 1¾ inch long, evidently massed and pointing upward on top sides of branches. *Fruit:* a deep purple cone from 2 to 4 inches long and 1 to 1½ inch in diameter.

Preferred Habitat.—Cool and moist sub-alpine situations; on slopes up to timber line and about mountain lakes and meadows.

Range.—Southeastern Alaska, British Columbia, through Washington, Idaho, and Montana to southern Arizona and New Mexico.

The Alpine Fir is one of the smallest, and probably the least known of the firs of the Pacific Coast. It grows in very inaccessible places and rarely exceeds 100 feet in height and 2 feet in diameter. Rare old trees, however, have been found which reach a height of 160 feet and a diameter of 4 feet. In exposed situations it is not unusual to find old specimens that are only 3 or 4 feet high but have lateral branches lying upon the ground many times longer than the height of the trees.

The Alpine Fir stands out among all its associates by reason of its long conical crown tipped with a spire-like point, which can be recognized at a long distance. Other distinctive features of this tree are its hard, flinty, ashy-gray bark, which is rarely fissured but usually marked with chalky-white blotches, and its dense tough branches, which droop at the base of the crown.

The pale bluish-green needles and the purplish cones from 2 to 4 inches long are also helpful means of distinguishing this unique tree of our western mountains, where it ascends almost to the timber line.

Photo by U. S. Forest Service

Courtesy of U. S. Dept. of Interior

GRAND FIR

A = Twig and cone in natural position; B = bract and lower side of seed-bearing scale; C = seed

Grand Fir

Abies grandis *Lindley*

Family.—Pine.

Other Names.—White Fir; Yellow Fir; Silver Fir; Great Silver Fir.

General Description.—*Shape:* crown narrow and pointed in young trees, somewhat rounded in old specimens. *Height:* 150 to 200, sometimes 250 to 275 feet, with diameter of 3 to 4 feet. *Bark:* on young trunks smooth and ashy-brown, dotted with chalky patches; on old trunks shallowly furrowed and dotted with gray-white blotches. *Leaves:* deep yellowish-green, white on lower surface, shiny, flat, grooved, blunt, notched at end, 1 to 2¼ inch long, appear in two lateral rows. *Fruit:* a light yellowish-green, cylindrical cone, 2½ to 4½ inches long and 1 to 1½ inch thick.

Preferred Habitat.—Moist situations. Common on alluvial stream bottoms, lower mountain slopes, depressions, and gulches.

Range.—Southern British Columbia to northern Idaho, western Montana, and northern coast of California.

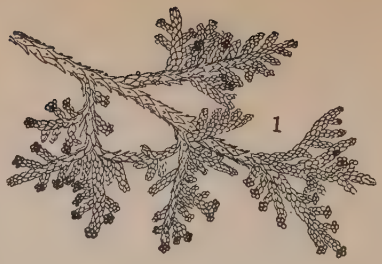
The name "Grand Fir" is very appropriate for this tree, for it is a very stately and grand tree when fully matured. It grows to a height of 150 to 200 feet upon favorable situations, such as bottom-lands, but exceptional specimens reach a height of 250 to 275 feet. Its stems are remarkably straight, have little taper, and bear narrow, open, conical crowns.

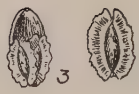
This tree is generally called "White Fir" for the reason that its smooth or shallowly furrowed bark is dotted with grayish-white blotches. The bark is very hard and horny and rarely over 1½ inch thick. The leaves are deep yellowish-green, flat, 1 to 2¼ inches long; notched at the end, and appear to grow in two rows on opposite sides of the branches.

Other helpful distinguishing characteristics are the pale russet-brown and minutely hairy twigs of the season, the resinous buds, and the light yellowish-green, cylindrical cones from 2½ to 4 inches long.

The real merits of this stately forest tree of the Pacific Coast region are just beginning to be known. It will not be long until it will take a front-line place in the practice of American forestry.

Photo by U. S. Forest Service





ARBOR VITAE

1 = A flowering branch; 2 = a branch with needles and fruit; 3 = a cone scale with winged seeds, natural size; 4 = a winged seed, enlarged; 5 = a seedling, natural size; 6 = position of branch

Arbor Vitæ

Thuja occidentalis *Linnæus*

Family Name.—Pine.

Other Names.—Cedar; White Cedar.

General Description.—*Shape:* conical and symmetrical. *Height:* 25 to 50, sometimes 75 feet. *Bark:* grayish-brown to reddish, furrowed, peels off in thin fibrous strips. *Buds:* very small, not scaly, hidden completely by scale-like leaves. *Leaves:* scale-like, 1/8 of an inch long, overlap each other closely, aromatic when crushed, marked with conspicuous glandular dots; those on the side of twigs are keeled, while those on the face of the twigs lie flat. *Flowers:* appear during April or May; pollen-bearing, inconspicuous, yellow, and almost round; seed-bearing, small, purplish, and ovoid. *Fruit:* an oblong cone, with 6 to 12 blunt-pointed, reddish-brown scales, about ½ inch long.

Preferred Habitat.—Low, swampy situations and cold bogs, but will grow in drier places.

Range.—Southern Labrador west to Manitoba and Minnesota, and south to North Carolina and Tennessee locally.

The common Arbor Vitæ is one of the most formal forest trees of eastern North America. It frequents cold bogs and swamps and occurs locally on moist hillsides.

The leaves of the Arbor Vitæ are only about one-eighth of an inch long and scale-like. They are arranged in pairs. Each succeeding pair alternates with the pair next to it. The leaves on the side of the twigs are keeled, while those on the face of the twig are flat; hence the flat appearance of the twigs when viewed from above. Each leaf is marked with a glandular dot, which is probably the source of the aromatic odor given off when a twig is crushed. The leaves persist for a number of years, during which time they cover the twigs so completely that the latter cannot be seen.

The oblong cones are a very helpful means of identification. They occur in loose clusters along the twigs, and consist of six to twelve blunt-pointed reddish-brown scales, about one-half of an inch long.

The trunk usually divides near the base into two or three branches, which grow up almost vertically alongside each other. The basal part of the trunk is usually furrowed, and the covering bark is grayish to reddish-brown, and peels off into thin fibrous strips.

Photo by U. S. Forest Service

WHITE CEDAR

1 = A flowering branch; 2 = a branch with needles and fruit; 3 = a cone, slightly enlarged; 4 = a winged seed, slightly enlarged; 5 = a seedling, natural size; 6 = portion of branch, enlarged

White Cedar

Chamaecyparis thyoides (*L.*) *BSP.*

Family.—Pine.

Other Names.—Cedar; Coast White Cedar; Southern White Cedar.

General Description.—*Shape:* conical, pointed, symmetrical. *Height:* 30 to 50, sometimes 90 feet. *Bark:* reddish-brown, slightly furrowed, peels off in thin film-like scales. *Leaves:* small, scale-like, sharp-pointed, bluish-green, closely overlapping, arranged in opposite pairs which give a four-ranked appearance. *Flowers:* appear during March or April; pollen-bearing, oblong, ¼ of an inch long; seed-bearing, round, about 1/10 of an inch in diameter. *Fruit:* a small, round, brownish-purple cone, about ¼ inch in diameter and bearing shield-shaped scales.

Preferred Habitat.—Swamps and marshes.

Range.—Cape Breton Island south along coast to Florida and Mississippi.

The White Cedar is essentially a species of the coastal plain region of the eastern United States, where it usually is found in swamps and marshes. It seems to thrive best when its roots are surrounded with water most of the year.

The White Cedar is easily distinguished from all our eastern conifers, particularly the closely related Arbor Vitæ, by its round and brownish purple cones, which are about one-quarter of an inch in diameter and bear several shield-shaped scales. The outer face of each scale is marked by a slight projection, and under each scale occur one or two seeds with small wings.

The twigs of the White Cedar are not so stout, flat, or distinctly fan-shaped as those of the Arbor Vitæ. The leaves are yellowish-green in color, while those of the former are bluish-green, and sometimes sharp-pointed or awl-shaped. A small glandular dot is often found on the backs of the leaves. It is, however, less conspicuous than those found on the leaves of the Arbor Vitæ.

The White Cedar is not so attractive for ornamental planting as the Arbor Vitæ, for it loses its lower branches, and the general appearance of the tree is scraggy when it becomes older.

REDWOOD

a = branch with open cones
b = seed

Courtesy of U. S. Forest Service

Redwood

Sequoia sempervirens *Endlicher*

Family.—Pine.

General Description.—*Shape:* when young, pyramidal; when old, small, shallow, and irregularly crowned. *Height:* 150 to 200, sometimes 350 feet, with an occasional diameter of 25 feet. *Bark:* thick, broad-ridged, separates into long, fibrous, dark-brown strips. *Leaves:* dark green above, pale green below, narrow, ½ to 1 inch long, sharp-pointed, two-ranked, spreading at wide angles to the twigs. *Flowers:* pollen-bearing, short-stalked, egg-shaped, blunt-pointed; seed-bearing, oblong, 1/5 of an inch long. *Fruit:* a small, oblong, hard, thick-scaled reddish-brown cone.

Preferred Habitat.—Moist soil and fog-laden climate.

Range.—Coast region of California and southwestern Oregon.

Every feature of the Redwood is interesting. Its only close relative is the Big Tree. The Redwood and the Big Tree comprise the group of trees known by the scientific name *Sequoia*. The name Sequoia was given to them in commemoration of Sequoyah, a talented Cherokee, also called George Guess, who prepared the first Indian alphabet. These two American forest trees are among the chief natural wonders of the world. The greatest (reliable) height is probably 365 feet, and most of the trees remain under 300 feet. An occasional specimen reaches a diameter of more than fifteen feet, but most of them are less than ten or twelve feet. The maximum age of the oldest specimen known to date does not exceed 4,000 years, and most of them remain under 2,000 years.

The Redwood is usually regarded as typical of the group; but since the Big Tree is the only other living representative, we may become acquainted with both of them by comparing their chief distinguishing characteristics:

Redwood *Sequoia sempervirens*	Big Tree *Sequoia gigantea*
Found only near the Pacific coast.	Found chiefly in the Sierras.
Reaches the greater height.	Reaches the greater diameter.
Leaves, usually spreading and of two forms, lance-like and scale-like.	Leaves all scale-like.
Cones usually less than one inch long.	Cones usually over two inches long.
Buds covered with scales.	Buds not covered with scales.
Bark cinnamon-brown.	Bark reddish-brown.

Photo by U. S. Forest Service

BALD CYPRESS

Courtesy of "Indiana Trees"

Bald Cypress

Taxodium distichum (*L.*) *Richard*

Family.—Pine.

Other Names.—Cypress; Deciduous Cypress.

General Description.—*Shape:* pyramidal to broad and round-topped. *Height:* 75 to 100, sometimes 150 feet. *Bark:* cinnamon-red, shallowly furrowed, covered with fibrous scales. *Leaves:* about ½ of an inch long, narrow, dark green above, yellowish-green to silvery-white below. *Flowers:* pollen-bearing, purplish in color, arranged in clusters 4 to 5 inches long and 1 to 2 inches wide; seed-bearing, scattered near end of branches. *Fruit:* an almost round brown cone, about one inch in diameter.

Preferred Habitat.—Moist, wet and swampy situations.

Range.—Coastal plain region from southern Delaware and southern New Jersey to Florida and Louisiana, and northward through the Mississippi Valley to Southern Indiana.

The Bald Cypress is no doubt familiar to everyone who has lived in or journeyed through the Coastal Plains region of the South.

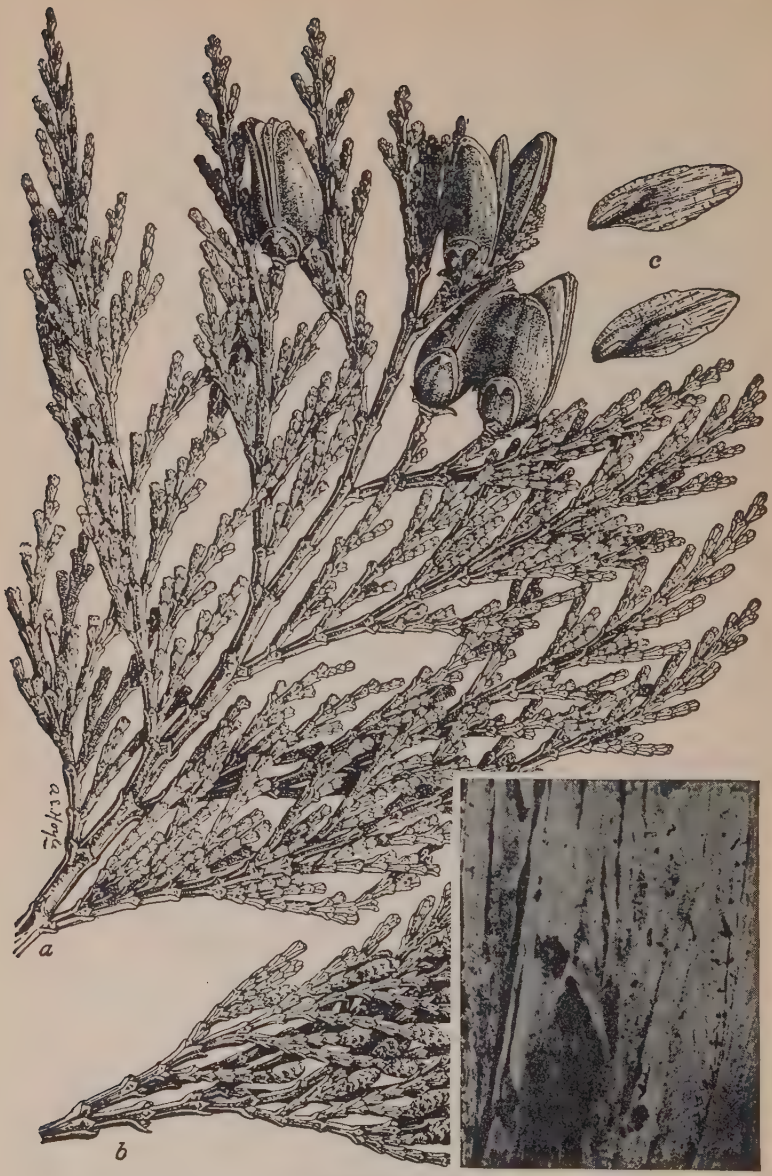
This tree has a number of interesting habits. It sheds all its leaves each fall, this being a rare habit among cone-bearing trees. The leaves do not fall singly, but those found on a slender twig drop together, taking with them the branchlet to which they are attached.

It frequents swamps, there growing upon soil submerged during the entire year. The most curious habit of this tree is the formation of cypress "knees," which are cone-like brown projections of the roots extending for several feet above the surface of the water. The exact function of these "knees" is not known, but it is generally thought that they are developed for the purpose of getting air to the submerged roots.

The brown cones which are round, rough, and about the size of the nut of the Black Walnut, are also a helpful means of identifying this interesting tree.

The Bald Cypress tree lives to a great age. Many trees have been felled which had attained an age of 400 to 600 years, and it is not difficult to find trees now that range in age from 750 to 1,000 years.

Courtesy of U. S. Forest Service



INCENSE CEDAR

a = Ripe, partly opened cones; b = branch with male flowers; c = seeds and their wings

Incense Cedar

Heyderia decurrens (*Torrey*) *K. Koch*

Family.—Pine.

Other Names.—Bastard Cedar; Red Cedar; Post Cedar.

General Description.—*Shape:* conical and compact in early life, on old trees more or less irregularly outlined. *Height:* 90 to 100, sometimes 150 feet, and a diameter of about 7 feet. *Bark:* bright yellowish-brown, irregularly furrowed, scaly to shreddy. *Leaves:* occur in whorls of four, scale-like, extend down along twigs; lateral leaves keeled and bear glands. *Flowers:* appear very early, sometimes during late January; pollen-bearing, golden yellow and produced in great numbers at tips of twigs; seed-bearing, roundish to oblong, about 1/8 of an inch long. *Fruit:* a drooping, oblong, reddish-brown cone, about 1 inch long, composed of 3 pairs of opposite scales.

Preferred Habitat.—Occurs on a great variety of soils, and a wide range of climate.

Range.—Oregon southward through California to Lower California, and east to Nevada.

The Incense Cedar attains a great age and a large size. Trees ranging from 350 to 500 years are not unusual, and occasionally they may become 800 to 1,000 years old. It varies greatly in size, but mature specimens average about 100 feet in height and three to four feet in diameter.

This tree has some striking distinguishing characteristics. Its drooping, blunt-pointed cones are entirely unlike those of any other American cone-bearing tree. They are from three-quarters to one and one-half inch long, and consist of three pairs of opposite scales, the middle pair alone bearing seeds. The shreddy, deeply-furrowed, yellowish-brown or cinnamon-colored bark is also a very helpful means of identification.

The most distinctive and attractive feature of the tree is the open, fan-shaped spray of branches. Except for the arrangement of the sprays, the branchlets covered with scale-like leaves resemble those of the eastern Arbor Vitæ.

The merits of the Incense Cedar are becoming better known each year. It has been successfully planted for ornamental purposes in part of continental Europe. A more extensive planting of it throughout the warmer part of the East is recommendable.

RED CEDAR

1 = A branch with pistillate flowers; 2 = a branch with staminate flowers; 3 = a branch with needles and fruit; 4 = a seedling, natural size; 5 = a branch with scale-like needles and a single berry-like fruit, natural size; 6 = a branch with awl-shaped needles

Red Cedar

Juniperus virginiana *Linnæus*

Family.—Pine.

Other Names.—Cedar; Juniper; Red Juniper; Savin.

General Description.—*Shape:* conical to pyramidal, and symmetrical. *Height:* 40 to 50, sometimes 100 feet. *Bark:* frequently furrowed, reddish-brown, peels off into long, narrow, stringy strips. *Leaves:* scale-shaped and awl-shaped may be found; scale-shaped are commonest, about 1/16 of an inch long, closely appressed to twigs, dark bluish green, and four-ranked; awl-shaped occur on young trees and vigorous shoots, are narrow, sharp-pointed, spreading, do not overlap, and are arranged in twos and threes. *Flowers:* appear during April or May; pollen-bearing and seed-bearing usually occur on different trees; pollen-bearing are short-stalked, yellow, comprise about 10 stamens, occur in large numbers; seed-bearing are small, comprise about 6 spreading, sharp-pointed bluish scales. *Fruit:* a dark blue berry, about ¼ of an inch in diameter, often covered with a whitish bloom.

Preferred Habitat.—Almost any location from a swamp to a sterile, rocky cliff. Reaches its best development on alluvial soils of the Southern States.

Range.—Nova Scotia west to Ontario and South Dakota, south to Florida and Texas.

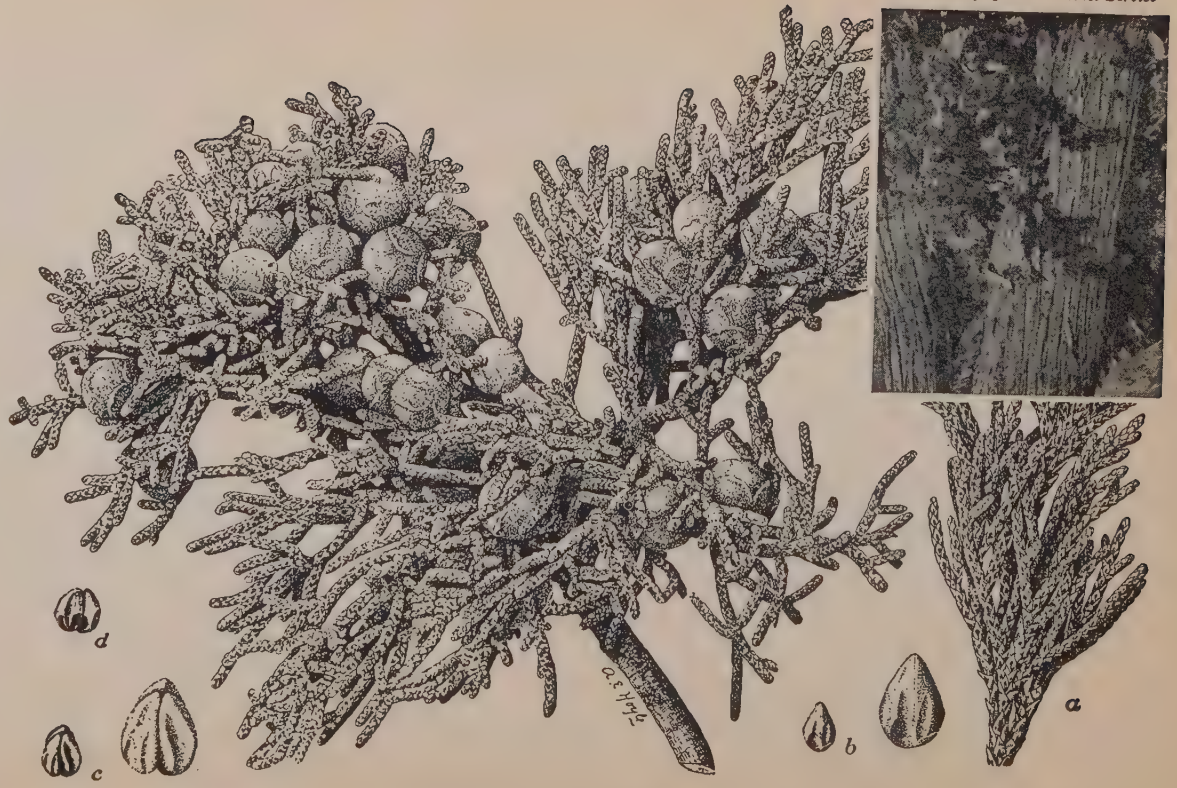
The Junipers are the most widely distributed group of trees on our continent. They may be found in nearly every State in the Union. Next to the Pines they have the largest number of representatives in North America of all the groups of trees belonging to the Pine Family.

Our common Red Cedar is the only native species of any commercial importance belonging to this group. Its berry-like fruit is known to every inhabitant of the country districts in which the trees occur. The berries are about the size of a small pea, dark blue in color and often covered with a white bloom. These berries are freely eaten by birds.

The leaves are also a helpful means of identification. Two kinds are recognized, namely, the scale-shaped, which are the commonest, and the awl-shaped, which occur on young trees and vigorous shoots.

The wood is soft, fragrant, works easily, has distinct red heartwood, and is very durable in contact with the soil. It is also notable for its fragrance, which property is supposed to ward off moths and other destructive insects, and consequently it is much used in the construction of clothes chests and closets. It was formerly widely used in the manufacture of lead pencils.

Courtesy of U. S. Forest Service



WESTERN JUNIPER

a—New shoot showing large form of leaves; b, c, d = showing variable number of seeds (natural size and enlarged twice natural size) divested of pulp

Western Juniper

Juniperus occidentalis *Hooker*

Family.—Pine.

Other Names.—Juniper; Cedar; Western Red Cedar; Mountain Juniper.

General Description.—*Shape:* crown round-topped, open, extending to a few feet from ground; trunk short and thick. *Height:* 15 to 20 feet, rarely 60 feet, and 40 inches in diameter. *Bark:* clear, light cinnamon-brown, firm, stringy, ½ to 1 inch thick, cut by wide shallow furrows. *Leaves:* short, pale ashy-green, scale-like, hug stiff twigs tightly and marked with a prominent white resin pit. *Fruit:* a bluish blackberry, 1/3 to ¼ of an inch long, maturing about September.

Preferred Habitat.—Exposed high mountain slopes and cañon sides. In dry rocky soil and sometimes in crevices of rocks.

Range.—Idaho, southeastern Washington, and eastern Oregon to southern California.

The Western Juniper is a tree of the high mountains, where it battles with the mighty winds and deep snow. The environment in which it lives has affected it, for its crown is open, round-topped, and extends to within a few feet of the ground, and its trunk is short and thick. Rarely is there more than 4 to 8 feet of clear trunk on any tree. This stubby or chunky appearance is very distinctive.

The fierce winds common to the habitat of this tree check its growth in height, but develop enormously large roots which enable it to anchor itself securely to the soil.

Some of the principal distinguishing characteristics of this tree are its bluish-black berry-like fruit, and its short, pale ashy-green, scale-like leaves, prominently marked on the back with glandular pits often filled with resin.

The thin, scaly, stringy, and reddish-brown bark and the pale brown wood, tinged with red, are also distinctive. The wood is similar to that of the Eastern Red Cedar, and it is quite probable that as it becomes better known it will also be used in the manufacture of lead pencils.

THE WILLOW FAMILY

SALICACEÆ

THE Willow Family comprises about 200 representatives, of which number 175 are Willows, and the remaining twenty-five Poplars or Aspens. Scientists may yet find evidence of a common ancestor of these two groups, for they are closely related.

The members of this family comprise both trees and shrubs which are found chiefly in the north temperate and Arctic zones. A few shrubby species extend far into the Arctic regions, and may be classed among the most boreal of our woody plants.

The flowers both of the Willows and Poplars appear early in spring, usually before the leaves begin to develop. The pollen-bearing (male) and seed-bearing (female) flowers always occur on different trees. A Willow or Poplar tree bearing male blossoms invariably will not have female flowers upon it. Consequently seed is produced only upon trees producing seed-bearing (pistillate) flowers.

Both the pollen-bearing and seed-bearing flowers are arranged in tassels, technically known as aments or catkins. The pollen-bearing flowers of many families of trees are so arranged, but in no other family do both kinds of flowers appear in drooping tassels.

All who have traveled in the out-of-doors in early springtime must have seen the "pussy buds," as the children call them. They are among the most beautiful objects of springtime, and are nothing other than the developing flower tassels of the Willows.

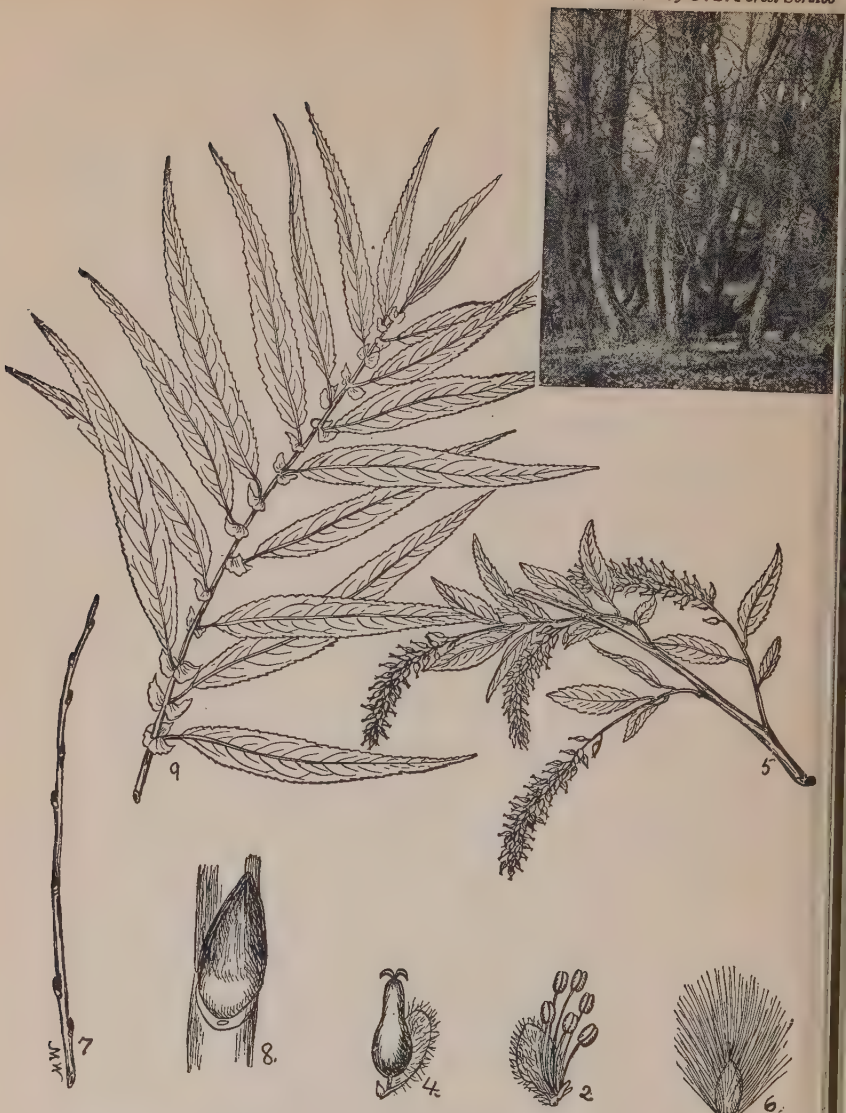
Both the Willows and Poplars are noted for their remarkable ability to grow from root and shoot cuttings. One may cut a short section of a twig, place it in moist ground, and feel assured that it will develop into a tree. This method of reproduction is used almost exclusively in the propagation of Willows to supply rods for the manufacture of baskets and furniture.

Few trees possess such a tenacious vitality as the Willows. They live for a long time after they seem to be dying, and repair damaged parts rapidly. They also reproduce freely. On very wet situations they often form dense thickets to the exclusion of almost all other woody growth.

One of the outstanding features both of the Poplars and Willows is the fact that they are well equipped to scatter their seeds. The seeds are very light, produced in great numbers, and furnished with a dense covering of long hairs which aid in their dispersal. No other group of trees is more abundant upon burnt-over areas in the northeast than the Aspens. I counted 24,792 specimens of Trembling Aspen (one to fifteen feet high) upon one acre of recently burnt-over mountain land in northern Pennsylvania. They spring up by the millions immediately after a forest fire, and in many localities take complete control of the situation. They, however, are short-lived, and, as a rule, are soon replaced by more permanent trees.

Summer or winter, day or night,
The woods are an ever-new delight;
They give us peace and they make us strong,
Such wonderful balms to them belong:
So living or dying, I'll take mine ease
Under the trees, under the trees.

Photo by U. S. Forest Service



BLACK WILLOW

2 = A staminate flowering branch; 4 = a pistillate flower, enlarged; 5 = a fruiting branch; 6 = a seed with hairs, enlarged; 7 = a winter twig; 8 = section of a winter twig with bud and leaf-scar enlarged; 9 = a leafy branch

Black Willow

SALIX NIGRA *Marshall*

FAMILY.—Willow.

GENERAL DESCRIPTION.—*Shape:* broad, symmetrical, round-topped. *Height:* 25 to 30, sometimes 80 feet. *Bark:* thick, deeply furrowed, blackish-brown. *Buds:* small, 1/8 of an inch long, sharp-pointed, covered by a single reddish-brown scale. *Leaves:* alternate, simple, very narrow, 3 inches long, sharp-pointed, finely toothed on margin, dark green above, pale green below. *Flowers:* appear in March or April before the leaves; pollen-bearing and seed-bearing occur on separate trees; both are arranged in drooping tassels about 3 inches long. *Fruit:* a small, smooth, reddish-brown capsule containing many small seeds bearing a tuft of hairs at one end.

PREFERRED HABITAT.—Moist to wet and open situations.

RANGE.—New Brunswick to Florida, west to Dakotas, California, and southern Arizona.

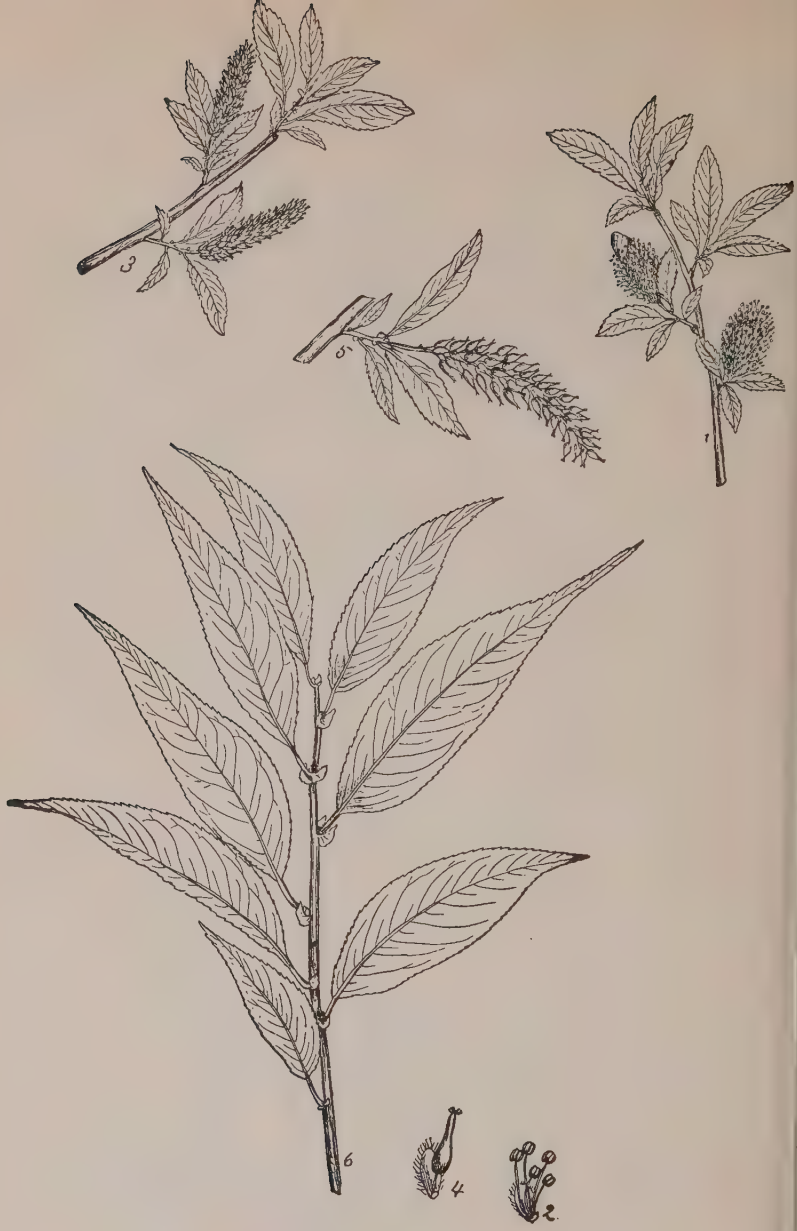
THE Black Willow is unquestionably the most important Willow from a lumberman's point of view. It has a wider distribution and attains a greater size than any other native Willow.

It may be distinguished by its long, narrow, sharp-pointed leaves, which are often bent in a slightly sickle-shaped fashion. They are dark green upon the upper surface and somewhat paler on the lower side. At the base of the rather short petiole there is attached a pair of round leaf-appendages (stipules), which apparently clasp the twig. The almost black, furrowed and flaky bark is a distinguishing characteristic during all seasons.

If a forest-grown Willow of large size is found, one is quite safe in calling it Black Willow, for it is the only native species which sometimes exceeds 100 feet in height and reaches a diameter of three feet.

The wood of the Black Willow is pale reddish-brown in color, and weighs about twenty-eight pounds per cubic foot. It is used chiefly in making boxes, excelsior, veneer, charcoal, powder, and artificial limbs.

Among the other native Willows which may attain small tree size are the Shining Willow and the Glaucous or Pussy Willow.



SHINING WILLOW

742

Shining Willow

Salix lucida *Muhlenberg*

Family.—Willow.

Other Name.—Glossy Willow.

General Description.—*Shape:* short-trunked, with a symmetrical, broad crown. *Height:* 10 to 15, sometimes 25 feet. *Bark:* smooth, thin, bitter, brown to reddish brown. *Buds:* alternate, smooth, about ¼ of an inch long, covered by a single yellowish-brown scale. *Leaves:* alternate, simple, long-pointed at apex, finely toothed on margin; smooth and very shiny above and pale below. *Flowers:* appear about April, arranged in tassels from one to two inches long. *Fruit:* a smooth-stalked, straw-colored, pale-brown capsule.

Preferred Habitat.—Wet situations. Common along streams, on islands, and in boggy places.

Range.—Newfoundland to Manitoba, south to Pennsylvania, and west to Kentucky and Nebraska.

The Shining Willow is common in wet situations, where it may be found in the form of a shrub or small tree. It can readily be distinguished by its shining leaves, which are lanceolate to ovate in outline. Its leaf-stalks, marked with glandular dots, are also distinctive.

In wintertime the shining brownish or yellowish twigs are a positive means of identification, and in early summer the smooth fruiting capsules are helpful in recognizing it, while in early spring the pollen-bearing flowers with five stamens are distinctive.

Both in its natural haunts and artificial environments it is one of the most beautiful of our small willows. Its glossy foliage is its special charm. It deserves a place of honor on the home grounds, because of its attractive appearance and the ease with which it is transplanted.

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1 = A staminate flowering branch; 2 = a staminate flower, slightly enlarged; 3 = a pistillate flowering branch; 4 = a pistillate flower, slightly enlarged; 5 = section of a fruiting branch; 6 = a branch with mature leaves

Photo by U. S. Forest Service

Courtesy of "Indiana Trees"

WHITE WILLOW

White Willow

SALIX ALBA *Linnæus*

FAMILY.—Willow.

OTHER NAMES.—Yellow Willow; Blue Willow.

GENERAL DESCRIPTION.—*Shape:* short-trunked, usually branches near the ground, and bears a spreading, irregular, round-topped crown. *Height:* 50 to 80 feet, with a diameter up to 3 feet. *Bark:* smooth, yellowish, becoming thick, rough, and dark ashy-gray on old trunks. *Buds:* alternate, blunt-pointed, covered with a single scale and placed against the stem. *Leaves:* alternate, simple, 2 to 5 inches long, ½ to 1 inch broad, and finely-toothed on margin. *Flowers:* appear early in spring and are grouped in drooping tassels; pollen-bearing and seed-producing, occur on different trees. *Fruit:* an ovoid, conical capsule, arranged in drooping tassels.

PREFERRED HABITAT.—Moist to wet situations; common along banks of streams and in meadows.

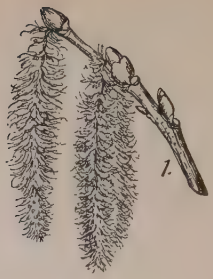
RANGE.—Native to Europe. Introduced early in the United States. Now found widely throughout the East and the Middle West.

THE White Willow is really a native of Europe, but it was introduced early into the United States. For generations it has been associated with the country landscape of New England, and is now widely distributed throughout the East and the Middle West. The White Willow is commonest along the banks of streams and other wet places. Its chief beauty and probably the most striking distinguishing characteristic are its dancing leaves, which are silky and pale on the lower surface. Whenever the slightest breeze blows the landscape is fairly illuminated, for the silvery-white lower surface of the leaf stands in such strong contrast with the dark-green upper surface.

In winter the yellowish twigs, dark ashy-gray bark, and the irregular crown are positive distinguishing characteristics. In fact, the White Willow has a rather ugly general appearance in winter. It is not unusual to find pollarded specimens, that is, trees with their crowns cut off completely. Such specimens often appear rather attractive in summer, but when devoid of foliage in winter are very unsightly. Pollarded trees, as a rule, throw out a cluster of rather long, straight sucker branches about the base of the trunk.

The White Willow has no special commercial value. Its wood is weak and soft, but its twigs are fairly valuable for basket-making. This tree's chief value lies in its ability to bind soil along streams, and as a beautifier of marshy meadows and pasture lands.

Most of the large Willows which one sees about human habitations are foreigners. They were introduced from other lands. Three of the commonest introduced Willows are White Willow, Weeping Willow, and Crack Willow. The Weeping Willow, the favorite tree of the Orient, has



TREMBLING ASPEN

1 = A staminate flowering branch; 2 = a staminate flower, enlarged; 3 = a pistillate flowering branch; 4 = a pistillate flower, enlarged; 5 = section of a fruiting branch; 6 = a seed with hairs, enlarged; 7 = a branch with mature leaves; 8 = a winter twig; 9 = section of a twig with a bud and a leaf-scar, enlarged

been planted extensively in the eastern United States, and may be recognized by its erect habitat and its long, drooping, and graceful branches.

The Crack Willow usually occurs along the banks of streams or in other wet situations, and may be recognized by its branches, which crack off very easily. After a storm one usually finds the ground beneath a Crack Willow covered with broken branchlets.

Trembling Aspen

Populus tremuloides (*Michaux*)

Family.—Willow.

Other Names.—American Aspen; Quaking Aspen; Small-toothed Aspen; Popple; Poplar; Aspen.

General Description.—*Shape:* high and narrow crowned, often round-topped. *Height:* 30 to 40, sometimes 80 feet. *Bark:* white to yellowish-green, smooth and close-fitting; on old trunks rough and black. *Buds:* narrow, conical, sharp-pointed, smooth, shiny, covered with 6 or 7 reddish-brown scales. *Leaves:* alternate, simple, nearly round, finely toothed on margin; leaf-stalks flattened laterally. *Flowers:* appear early in spring; pollen-bearing and seed-bearing occur on different trees; both are arranged in slender, drooping tassels. *Fruit:* a two-valved capsule containing small seeds surrounded with tufts of hairs.

Preferred Habitat.—Found on practically all kinds of soil except in swamps.

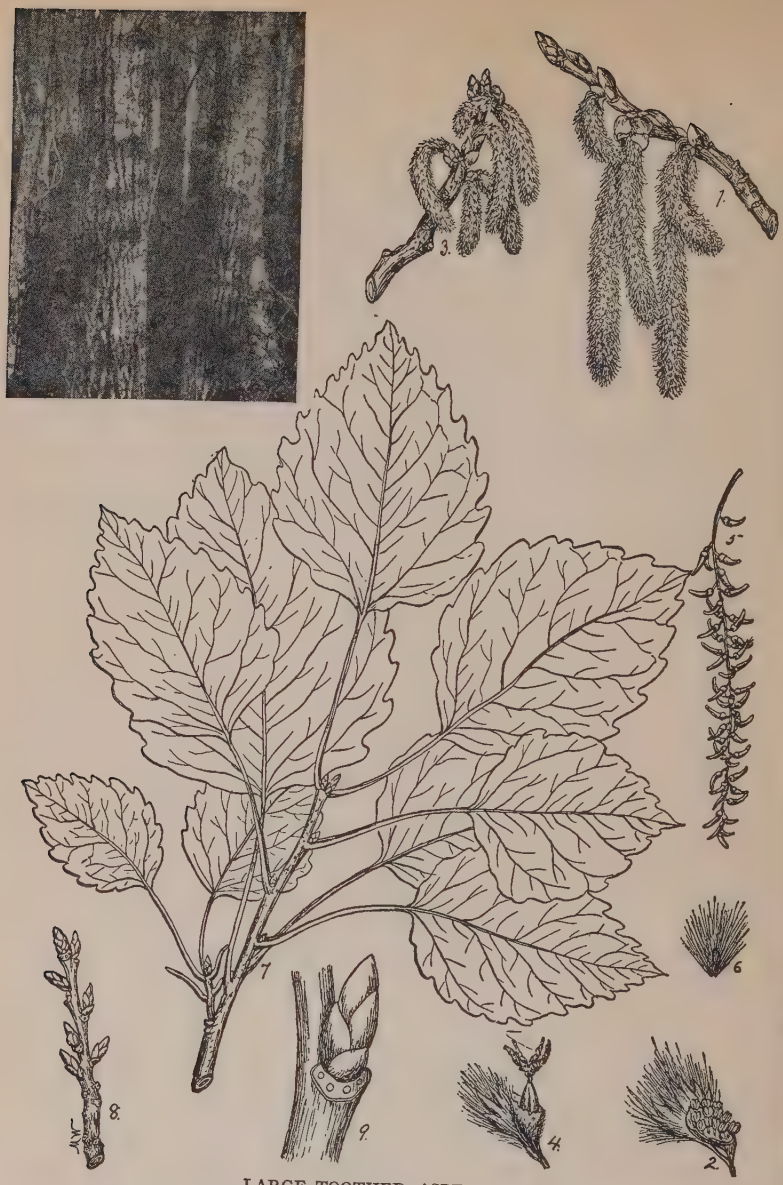
Range.—A transcontinental species, extending from Newfoundland to Alaska, and south to Kentucky and Mexico.

If trees had human characteristics, the Aspens would be the pioneers of the forest community, for they open the way for other trees in the course of forest succession. Like a mighty army they march along and cover the bare soil left in the wake of destructive forest fires.

The Trembling Aspen has the widest range of any tree native to North America. It is a transcontinental species, extending from Newfoundland to the Hudson Bay region and Alaska, south to Pennsylvania, and along the mountains to Kentucky, and west through the Rocky Mountains to California and Mexico.

The trembling foliage is the most distinctive character of the tree. In summer one may distinguish the Trembling Aspen by its ovate to nearly round leaves, with finely toothed margins; and in winter the sharp-pointed, conical, and often uncurved buds, with an apparent coating of varnish, are characteristic.

The bark is also a helpful means of identification. It changes with the weather and climate. In the Rocky Mountain region and the far north the bark on small trunks is almost white, while in lower situations yellowish-green appears to be the prevailing color. Nothing is more impressive than to watch the changing color of the bark. As soon as it becomes wet it changes from a yellowish-green to a deep olive green, which is one of the most beautiful colors in nature.



LARGE-TOOTHED ASPEN

1 = A staminate flowering branch; 2 = a staminate flower, enlarged; 3 = a pistillate flowering branch; 4 = a pistillate flower, enlarged; 5 = a fruiting catkin with capsules; 6 = a seed with hairs, enlarged; 7 = a branch with mature foliage; 8 = a winter twig; 9 = section of a winter twig, enlarged

Large-toothed Aspen

Populus grandidentata *Michaux*

Family.—Willow.

Other Names.—Popple; Poplar; Aspen.

General Description.—*Shape:* long slender trunk, bearing an irregular, shallow crown. *Height:* 30 to 40, sometimes 70 feet, with a diameter of 2 feet. *Bark:* on old trunks thick, rough, blackish and hard; elevated surface between furrows smooth. *Buds:* alternate, egg-shaped to conical, pointed, dusty-dull, covered by 6 to 7 chestnut-brown scales. *Leaves:* alternate, simple, broadly egg-shaped, 3 to 4 inches long, coarsely-toothed on margin; leaf-stalk flattened laterally. *Flowers:* appear about April, pollen-bearing and seed-producing occur on different trees; pollen-bearing, arranged in drooping tassels, 1½ to 2½ inches long; seed-producing arranged in drooping tassels 1½ to 2½ and sometimes 4 inches long. *Fruit:* a conical 2-valved capsule borne on a drooping stalk about 4 inches long.

Preferred Habitat.—Rich, moist soil; also found upon dry, gravelly situations, in abandoned fields, on cut-over areas, and forest fire burns.

Range.—Nova Scotia and Ontario to Minnesota, south to Pennsylvania, and along the mountains to North Carolina.

The Large-toothed Aspen is a tree of the Northwoods but extends southward along the Allegheny Mountains to North Carolina. In summer, the Large-toothed Aspen may be distinguished by its medium-sized leaves with coarsely-toothed margins and vertically flattened leaf-stalks, which give the leaves considerable freedom of motion. The leaves of sucker shoots which spring up from underground roots are larger than normal, and usually densely coated with hairs on the lower surface.

The Large-toothed Aspen may be recognized with little difficulty in winter. Only the Trembling Aspen resembles it closely, and these two common trees have striking distinguishing characteristics. The buds of the Large-toothed Aspen are stout, blunt-pointed, divergent, and covered with a flour-like, crusty, woolly substance, while those of the Trembling Aspen are slender, sharp-pointed, smooth, glossy, and closely appressed to twigs. The twigs of the Large-toothed Aspen are yellowish-brown, and pale-downy or pale-scaly, and its lateral branches are less ascending than those of the Trembling Aspen.

The dark-gray, hard, and thick bark, roughened by short, vertical, blackish furrows, is a helpful distinguishing characteristic at all seasons of the year. The large-toothed Aspen is not a valuable timber tree, but it should be protected, for it produces valuable pulp-wood and helps restore a forest growth upon burnt-over and lumbered areas.

COTTONWOOD

Cottonwood

Populus deltoides *Marshall*

Family.—Willow.

Other Names.—Carolina Poplar; Cotton Tree; Whitewood.

General Description.—*Shape:* a long clean trunk bearing a high pyramidal crown. *Height:* 50 to 75, sometimes 100 feet, with a diameter of 6 feet. *Bark:* on old trunks ash-gray, roughened by long deep furrows; on younger trunks thin, smooth, and greenish-yellow. *Buds:* alternate, smooth, glossy, resinous, chestnut-brown; terminal buds often 5-angled, and larger than lateral ones; lateral buds usually divergent and often recurved. *Leaves:* alternate, simple, broadly deltoid, sharp-pointed at apex, coarsely-toothed on margin, 3 to 5 inches long; leaf-stalks flattened laterally. *Flowers:* appear in March or April; pollen-bearing and fruit-producing occur on different trees; pollen-producing, occur in drooping tassels, 3 to 4 inches long and densely flowered; fruit-producing, occur in drooping tassels 2½ to 3½ inches long and sparsely flowered. *Fruit:* a dark green, 3 to 4 valved capsules containing many small seeds arranged in drooping tassels which may become 8 to 12 inches long.

Preferred Habitat.—Rich, moist soil; common on banks of streams, borders of lakes and swampy situations.

Range.—Quebec and Ontario to Florida and west to Rocky Mountains.

The Cottonwood is probably the commonest planted tree in the Great Plains region of the Middle West. In the more eastern part of its range it is neither so common nor does it reach so large a size as in the Mississippi Valley.

The Cottonwood, more frequently called Carolina Poplar, can readily be distinguished at any season of the year by its ashy-gray bark, roughened by deep furrows which usually parallel each other but are often connected, by its lateral branches which have a tendency to take a rather upright position, and by its yellowish stout twigs which have prominent ridges running down from the leaf-scars.

The buds are larger, more resinous, and more flattened than those of other Poplars and Aspens, and they usually stand out from the twigs and are conspicuously incurved.

The leaves are very distinctive. They are evidently deltoid in outline, straight-based, and long-pointed at apex. The leaf-stalks are flattened laterally. The young shoots are greenish to brownish, often striped lengthwise or spotted with grayish dots.

Reliable records show that this tree has grown 5 feet in height in a single year and 40 feet in 10 years. It cannot be recommended for street planting, for its roots lift pavements and clog drains and sewers.

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2 = A staminate flower, enlarged; 3 = a pistillate flowering branch; 4 = a pistillate flower, enlarged; 5 = section of a branch with a fruiting catkin and capsules; 6 = a seed with hairs, enlarged; 7 = section of a branch with mature foliage; 8 = a winter twig; 9 = section of a winter twig, enlarged

Photo by U. S. Forest Service

SILVER POPLAR

Courtesy of "Indiana Trees"

Silver Poplar

Populus alba *Linnæus*

Family.—Willow.

Other Names.—White Poplar; Silver-leaf Poplar.

General Description.—*Shape:* a medium-sized tree with a stout trunk bearing a large, irregular, broad, round-topped crown. *Height:* 40 to 60, sometimes 75 feet. *Bark:* on old trunks deeply furrowed into firm, dark ridges; on young trunks and large branches, smooth, light greenish-gray or whitish, often dotted with dark blotches. *Buds:* small, egg-shaped to conical, light chestnut-brown, more or less covered with cottony wool. *Leaves:* alternate, simple, coarsely-toothed, often 3 to 5-lobed, very dark green on upper surface and glistening white on lower surface. *Flowers:* appear early in spring; pollen-bearing and seed-producing arranged in drooping tassels from 1½ to 4 inches long. *Fruit:* a 2-valved capsule borne on a drooping stalk from 2 to 4 inches long.

Preferred Habitat.—Rich, moist soil, but will grow on a wide range of situations.

Range.—Native of the Old World. Introduced from England by the early settlers, and soon established in many towns of New England. Now found throughout the East from New Brunswick and Nova Scotia to Virginia.

The White Poplar is native to both Europe and Asia. It is now distributed widely throughout the eastern United States.

The most striking distinguishing characteristic of the Silver Poplar is the marked difference in color between the lower and the upper surfaces of its leaves. The upper side is very dark green and glossy, which when shadowed is almost black, while the lower surface is a glistening white, which shows up in a very striking manner when the wind blows violently. This silvery pubescence is not confined by any means to the lower surface of the leaves, for in winter one can distinguish this tree from all others with which it is associated by the dense cottony covering found upon the twigs and buds.

The Silver Poplar, just as all other Poplars, produces its pollen-bearing and seed-producing flowers on different trees. The flowers emerge from the large flower buds very early in spring, and develop into drooping tassels. The cottony seeds mature in several weeks, and are then scattered far and wide by the wind, because of their light weight and numerous hairs which are attached to them.

The Silver Poplar is common about towns and abandoned building sites. It is a very rapid-growing tree, but unfortunately becomes defective before it is old. It is not recommendable for extensive ornamental planting.

THE WALNUT FAMILY

JUGLANDACEÆ

THE Walnut Family is one of the most important of those having tree representatives in North America. It comprises six different groups of trees and shrubs having a total membership of about thirty-five species, found chiefly in the warmer portion of the north temperate zone.

The two most important groups of trees belonging to this family are the Walnuts and Hickories, both of which yield valuable wood and edible nuts. These two important groups may be distinguished from each other by the following characteristics:

Walnuts	Hickories
1. Pith of twigs chambered.	1. Pith of twigs continuous.
2. Nuts rough and sculptured.	2. Nuts smooth or ridged.
3. Husk of fruit does not split.	3. Husk of fruit splits into valves.
4. Tassels of pollen-bearing flowers are thick, compact, not stalked, and occur singly.	4. Tassels of pollen-bearing flowers are slender, flexible, stalked, and occur in threes.
5. Wood light brown to dark brown; pores scattered rather evenly throughout growth ring.	5. Wood white to reddish-brown; large pores arranged in concentric rings.

There are fifteen different kinds of Walnuts known in the world, five of which are native to North America. Two of these—Black Walnut and Butternut—are found in the eastern United States.

In addition to the native Walnuts, the English Walnut, native to southern Europe, is distributed widely in the United States as a nut and ornamental tree. This tree yields the valuable Circassian Walnut wood of commerce, used so extensively in the manufacture of furniture.

All but one of the eleven known species of Hickory are native to that part of North America which lies east of the Rocky Mountains. Geological records inform us that the Hickories originally extended into Greenland, and were found in Europe. To-day no native species occur there. The belief is prevalent that they were destroyed during the ice age, and have not been able to re-establish themselves.

The Hickories are among our most important timber trees. They maintain an important position not on account of the large quantity, but the special quality of wood which they produce. The wood is used for special purposes, for which no satisfactory substitute has yet been found. It is strong, moderately light in weight, extremely elastic, and used extensively for handles and in the manufacture of wagons, carriages, and other vehicles.

The nuts of some of the Hickories are edible. They were used by the Indians for food and oil, and at the present time the nuts of the Shell-bark, Shag-bark, and Pecan Hickories are important articles of commerce. The nuts of the Pignut and Swamp Hickories are not edible, but in the South they are used in large quantities to fatten hogs.

Plant oak or ash on useless spots of ground,
A birch or willow at the murmuring brook;
Some flowering shrub upon the grassy mound
Or useful tree in any vacant nook.
The graceful maple and the fragrant pine
On school-house grounds where children love to play
Some hardy trees along the highway's line
To shade the traveler on his tiresome way.

BLACK WALNUT

1 = Branch with developing leaves and (s) three solitary catkins of staminate flowers and (p) a spike with three pistillate flowers; 2 = a staminate flower, slightly enlarged; 3 = a pistillate flower, slightly enlarged; 4 = a branch with a mature leaf and fruit; 5 = a winter twig; 7 = section of twig showing superposed and gaping buds, and leaf-scars and three clusters of bundle-scars and notched upper surface, slightly enlarged; 8 = a nut with husk removed; 9 = terminal section of winter twig showing leaf-scar and terminal bud with bud-scales, slightly enlarged

Black Walnut

Juglans nigra *Linnæus*

Family.—Walnut.

Other Names.—Walnut; Walnut-tree.

General Description.—*Shape:* crown broad and round-topped. *Height:* 80 to 100 sometimes 150 feet. *Bark:* thick, rough, furrowed, dark brown to grayish-black. *Buds:* terminal bud flattened, ¼ to ½ of an inch long, grayish-brown and hairy; lateral buds round, 1/6 of an inch long, grayish-brown and hairy. *Leaves:* alternate, compound, with 13 to 23 leaflets. *Leaf-scars:* large, three-lobed, often heart-shaped, containing three groups of bundle-scars. *Flowers:* appear about May; pollen-bearing and seed-bearing are separate, but occur on same tree; the former are arranged in unbranched, drooping tassels, and the latter in 2 to 5 flowered clusters. *Fruit:* a sculptured nut with a fleshy non-splitting covering.

Preferred Habitat.—Rich, moist and deep soil. Requires plenty of light, and ample room for its long taproot.

Range.—New England to Minnesota, and south to Florida.

The Black Walnut is more fortunate than most of its associates in that it has only a few common names. Throughout its entire range of 650,000 square miles it is called Walnut, Black Walnut, or Walnut-tree. The adjective *black* refers to the color of the wood and bark, and enables one to distinguish it easily from the closely related White Walnut, or Butternut.

The Black Walnut bears little resemblance to any other forest tree except the Butternut. These two trees may readily be distinguished from other forest trees by their rough and sculptured nuts, covered with a non-splitting husk, and their chambered pith. For distinguishing characteristics between the Black Walnut and the Butternut see the description under the latter species.

The wood of Black Walnut now brings the highest price of any of our native woods. It is no longer destroyed and wasted, but every available piece is collected and manufactured into some useful commodity. It is extensively used in the manufacture of furniture, sewing machines, musical instruments, and coffins. Large quantities are consumed at home and abroad for the manufacture of gun-stocks. Black Walnut was in great demand during the Civil War for gun-stocks, and during the recent World War fabulous prices were offered for almost any grade, much of it being used for making propellers for airplanes.

Much is now being done to perpetuate this tree in the way of planting nuts and seedlings.

The Black Walnut is the only tree that bears a close resemblance to the Butternut. These two trees may be distinguished from each other by the following characteristics:

BUTTERNUT

Black Walnut	Butternut
1. 13 to 23 leaflets to each leaf.	1. 11 to 17 leaflets to each leaf.
2. bark is dark brown to black.	2. bark is gray.
3. pith is light brown.	3. pith is dark brown.
4. nut is round.	4. nut is elongated.
5. husk of fruit is smooth.	5. husk of fruit is hairy and sticky.
6. terminal bud is as broad as long.	6. terminal bud is longer than broad.
7. No hairy fringe occurs above leaf-scar.	7. hairy fringe present above leaf-scar.

Butternut

Juglans Cinerea *Linnæus*

Family.—Walnut.

Other Names.—White Walnut; Oil Nut.

General Description.—*Shape:* short-trunked, bearing a broad, round-topped and unsymmetrical crown. *Height:* 30 to 50, sometimes 80 to 100 feet, with a diameter of 4 feet. *Bark:* on young trunks smooth and light gray; on old trunks light gray, roughened by black fissures; inner bark bitter, becoming yellow on exposure. *Buds:* alternate, covered with dense pale down; terminal bud ½ to ¾ of an inch long, flattened and blunt-pointed; lateral buds egg-shaped, very blunt-pointed, often superposed. *Leaves:* alternate, 15 to 30 inches long, compound, with 11 to 17 leaflets. *Flowers:* appear about May; pollen-bearing, arranged in unbranched drooping tassels, 3 to 5 inches long; fruit-producing occur in 6 to 8 flowered spikes. *Fruit:* an elongated, egg-shaped, deeply sculptured nut covered with a non-splitting, fleshy husk.

Preferred Habitat.—Rich, moist soil; common along fences, streams, and roads.

Range.—New Brunswick to Minnesota, south to Delaware and Arkansas, and along the mountains to Georgia.

The Butternut is one of the best-known nut-bearing trees native to the eastern part of the United States. While it is attractive and thrives well in the forest, and along fences, streams, and roads, it cannot be depended upon for ornamental planting. Wherever planted, it develops a poor form, and dead branches soon disfigure its appearance.

The Butternut and the Black Walnut can be distinguished easily from

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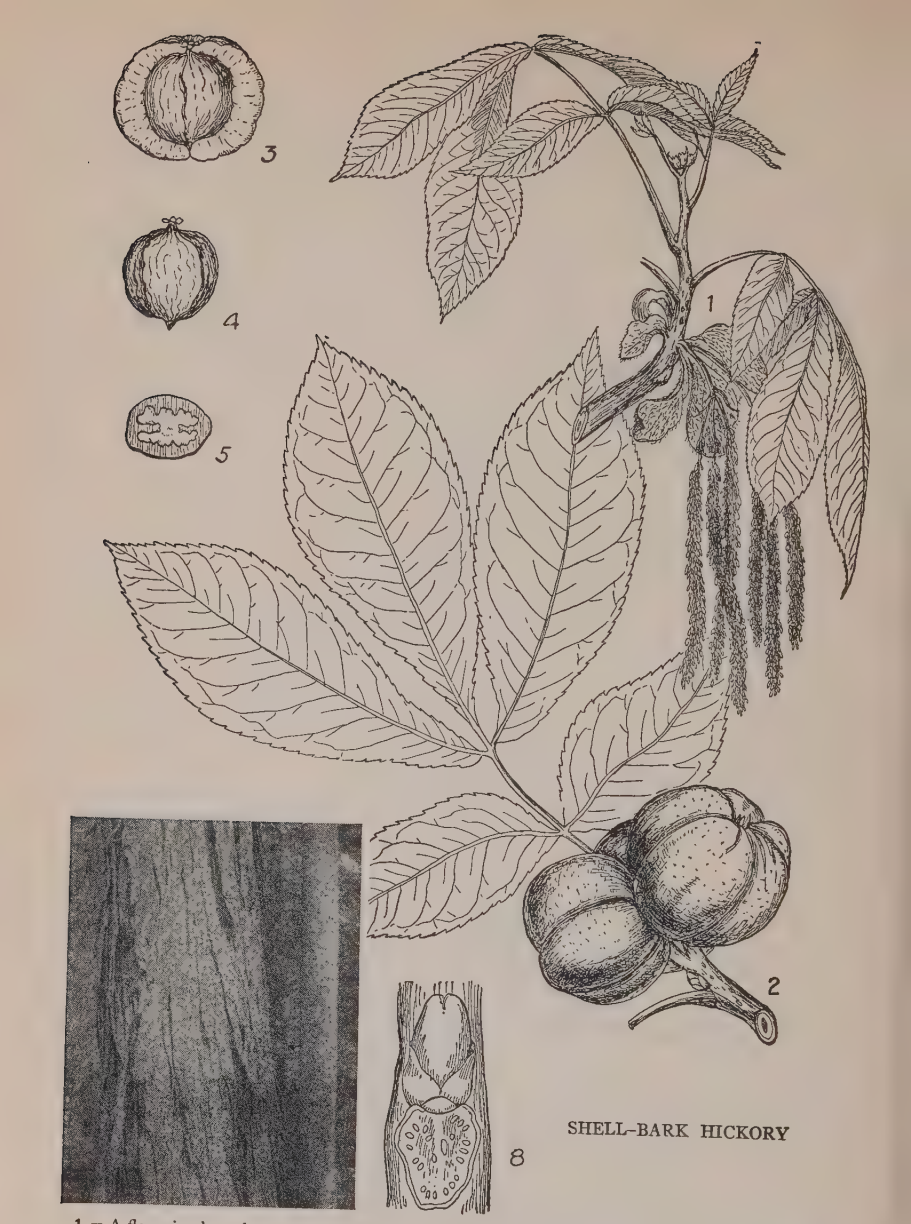
• = Branch with one-half developed leaves, (s) three unbranched catkins of staminate flowers, and (p) a cluster of pistillate flowers; 2 = a mature leaflet; 3 = a staminate flower, slightly enlarged; 4 = a pistillate flower slightly enlarged; 5 = a cluster of mature fruit; 6 = a winter twig showing buds, lenticels, and leaf-scars; 7 = longitudinal section of twig showing chambered pith, slightly enlarged; 9 = a nut with husk removed; 10 = a terminal bud, natural size; 11 = a terminal bud (broad-side view), natural size; 12 = section of a branch showing superposed lateral flower buds, enlarged.



SHELL-BARK HICKORY

1 = A flowering branch; 2 = a branch with fruit and a mature leaf; 3 = a nut with part of husk removed; 4 = a nut; 5 = cross-section of nut showing kernel; 8 = section of a winter twig, showing lateral bud and leaf-scar, enlarged

the Hickories at any season of the year by their twigs, which contain a brown and chambered pith. The Hickories have a white and continuous pith, not broken up into compartments. The Butternut, Black Walnut, and Hackberry are the only three trees native to the eastern United States that have chambered pith.

Shell-bark Hickory

Carya ovata (*Miller*) *K. Koch*

Family.—Walnut.

Other Names.—Hickory; Shag-bark Hickory.

General Description.—*Shape:* oblong-cylindrical and high. *Height:* 50 to 75, sometimes 120 feet. *Bark:* on old trunks shaggy and light gray; on young trunks smooth and grayish to reddish-brown. *Buds:* broadly egg-shaped, pointed, about 3/4 of an inch long, covered with 10 dark-brown and often hairy bud scales. *Leaves:* alternate, compound, with 5 to 7 leaflets. *Leaf-scars:* large, heart-shaped, contain numerous bundle-scars. *Flowers:* appear about May; pollen-bearing and seed-bearing occur separately, the former in drooping three-branched tassels and the latter in 2 to 5 flowered spikes. *Fruit:* a nut covered with a thick free-splitting husk.

Preferred Habitat.—Rich, moist soil and plenty of light.

Range.—Quebec to Minnesota, south to Florida and Texas.

The Shag-bark is the largest of the true Hickories. It is well-known throughout its entire range. Its wide acquaintance is due to the highly prized wood, shaggy bark, and delicious nuts which it produces.

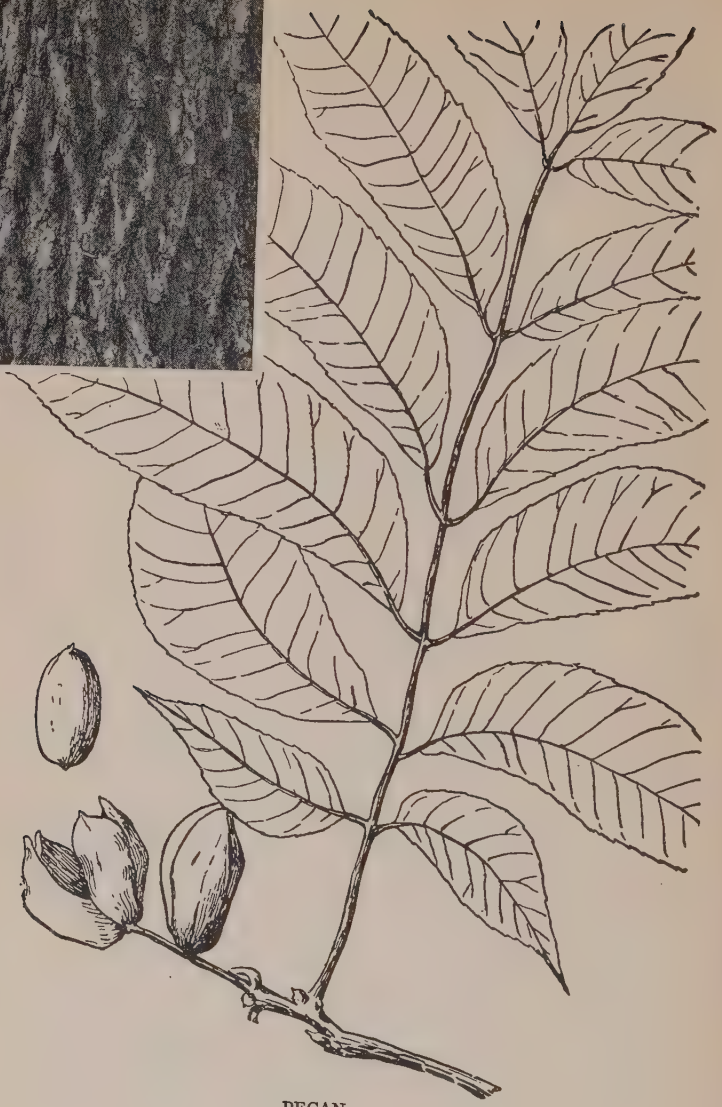
The Shell-bark Hickory is the most easily recognized of our Hickories. During all seasons of the year the larger trees may be recognized by the distinctly scaly bark of the trunk, which has given the tree the name Shag-bark and Shell-bark Hickory. When covered with foliage it may be distinguished by its rather large compound leaves, with usually five leaflets and a smooth leaf-stalk.

In winter the smooth reddish-brown twigs covered with white dots and bearing broadly egg-shaped buds with about ten grayish-brown bud-scales are helpful means of identification. In autumn the Shell-bark Hickory may be recognized by its fruit.

The wood is heavy, hard, strong, tough, elastic, and usually straight-grained. It weighs from fifty to fifty-two pounds per cubic foot, and is used extensively for handles and in the manufacture of vehicles.

The Shell-bark Hickory is an extremely important forest tree. It was originally found over about 1,000,000 square miles, but to-day it occurs on a more limited area. This tree is marching on toward extinction, and we should do everything possible to protect and propagate it.

Photo by U. S. Forest Service



PECAN

Courtesy of "Indiana Trees"

Pecan

Carya illinoensis (*Wangenheim*) *K. Koch*

Family.—Walnut.

Other Name.—Pecan Hickory.

General Description.—*Shape:* a tall, massive trunk bearing a narrowly symmetrical, broad, round-topped crown. *Height:* 80 to 100, sometimes 120 feet, with a diameter of 6 feet. *Bark:* light brown, tinged with red, tight-fitting, rather deeply furrowed, becoming somewhat scaly. *Buds:* alternate, covered with yellowish scales; lateral buds smaller than the terminal. *Leaves:* alternate, 12 to 20 inches long, compound, with 9 to 17 leaflets. *Flowers:* appear about May, when leaves are about half developed; pollen-bearing occur in drooping tassels arranged in clusters of three on a single stalk; fruit-producing occur on new growth in 2 to 5 flowered spikes. *Fruit:* an elongated, egg-shaped, reddish-brown nut, covered with a splitting husk, 1½ to 2 inches long; nuts occur in clusters of 3 to 11.

Preferred Habitat.—Low, rich ground near streams.

Range.—Iowa and Kansas to southern Illinois, south to Louisiana and Texas; most abundant and largest in southern Arkansas and eastern Texas.

The Pecan is the most important nut-bearing tree native to the United States. The value of the nuts for food has long been recognized in the lower Mississippi Valley, where the tree is native. During the last 40 years great progress has been made in improving the size and quality of the nuts, and many commercial Pecan orchards have been established.

A mere glance at a Pecan tree is enough to show its relationship to our common Hickories. The compound leaves with 9 to 17 slender, long-pointed and slightly sickle-shaped leaflets are distinctive. The pollen-bearing flowers are arranged in slender, drooping tassels, which occur in threes on a single stalk, as do those of the other Hickories. Those of the Pecan are more slender than those of other species.

The most striking distinguishing characteristic of the Pecan is its fruit. It occurs in compact clusters of 3 to 11 nuts, each nut with a thin husk, which is more or less winged along the sutures. The kernel of the nuts is large and sweet.

Many different horticultural varieties of Pecan have been developed, and it seems fair to predict that the Pecan orchard business will continue to extend itself, for there is a ready market for all the nuts produced.

PIGNUT HICKORY

1 = Branch with immature leaves and flowers; 2 = branch with mature leaves and fruit with husk partly removed; 3 = a nut with husk removed; 4 = cross-section of a nut; 7 = a leaf-scar with bundle-scars, enlarged

Pignut Hickory

Carya glabra (*Miller*) *Spach*

Family.—Walnut.

Other Names.—Broom Hickory; Bitter-nut Hickory.

General Description.—*Shape:* slender, clean and long-trunked, with narrow, oblong crown. *Height:* 50 to 60, sometimes 90 feet, with a diameter of 4 feet. *Bark:* close, dark green, shallowly furrowed, rarely peels off in plates. *Buds:* alternate, more than 2-ranked, reddish-brown to gray, oval and blunt-pointed. *Leaves:* alternate, 8 to 12 inches long, compound, with 5 to 7 leaflets. *Flowers:* appear about May, when leaves are half developed; pollen-bearing, occur in drooping tassels from 3 to 5 inches long, and clustered in threes on a common stalk; fruit-producing, occur in 2 to 5 flowered spikes. *Fruit:* variable in shape and size; pear-shaped or spherical; reddish-brown nut 1 to 2 inches long and covered by a husk which may remain closed or split open from the apex toward the middle.

Preferred Habitat.—Dry ridges and hillsides; rare in swampy situations; frequently found with Chestnut and the Oaks.

Range.—Maine and Ontario to Manitoba and Nebraska, and south to Florida and Texas.

The Pignut Hickory, unlike most of the Hickories, is a tree of the uplands, rather than the lowlands. Like so many other heavy-seeded hardwood trees, it reaches its largest size in the Ohio Valley, where exceptional specimens measure 120 feet in height.

The Pignut Hickory is most easily distinguished in winter by its smooth and rather slender twigs, and its small, oval, reddish-brown buds covered with scales, the outer pair of which is smooth and glandular dotted. The outer bud-scales fall off before spring, thus exposing the inner velvety scales. Its buds are not yellow like those of the Bitter-nut Hickory, and are smaller than those of the other Hickories associated with it.

In autumn it can be distinguished by the pear-shaped to ovoid fruit, the husk of which does not split to the base. The nut is usually small, more or less four-angled toward the tip, and contains a small and rather bitter kernel.

In summer the compound leaves with smooth leaf-stalks and 5 to 7 small leaflets are distinctive. At all seasons of the year the dark-gray, close-fitting, non-scaly, and shallowly-furrowed bark is helpful in recognizing it.

The Pignut Hickory is a valuable forest tree. It produces high-grade wood, which is becoming very scarce. Special efforts should be put forth to protect and propagate this tree.

WHITE HICKORY

White Hickory

CARYA ALBA (*Linnæus*) *K. Koch*

FAMILY.—Walnut.

OTHER NAMES.—Mocker-nut Hickory; Bull Nut Hickory; Big Bud Hickory; White-heart Hickory.

GENERAL DESCRIPTION.—*Shape:* trunk straight and clean, bearing a broad, round-topped crown. *Height:* 50 to 75, sometimes 90 feet, with a diameter of 3 feet. *Bark:* light to dark gray, close fitting, not shaggy, roughened by irregular furrows. *Buds:* alternate, more than 2-ranked; terminal bud large, egg-shaped, 2/5 to 4/5 of an inch long, very hairy and blunt-pointed; lateral buds smaller than the terminal, reddish-brown, and stand out from twig. *Leaves:* alternate, 8 to 12 inches long, compound with usually 5 to 7 leaflets. *Flowers:* appear about May, when leaves are half developed; pollen-bearing, borne in slender tassels 4 to 5 inches long and arranged in clusters of 3; fruit-producing, borne in 2 to 5 flowered, pale, hairy spikes. *Fruit:* a round, 4-ridged brownish nut covered with a thick hard husk, which splits to the middle or base.

PREFERRED HABITAT.—Rich, moist woods; requires considerable moisture and sunlight; occurs chiefly in valleys and in fertile situations at bottom of mountain slopes.

RANGE.—Ontario and Massachusetts to Nebraska, and south to Florida and Texas.

AT least three of the many common names given to this tree are appropriate. It is called White Hickory because a large proportion of its wood is white sapwood. Some wood workers think its wood is better than that of other Hickories because of the larger amount of white sapwood which it yields. The name Big Bud Hickory is applied to it because the terminal buds are truly big, being larger than those of any other Hickory. "The name Mocker-nut stands for (New York) Dutch *mokernoot*, 'heavy-hammer nut,' *i. e.* one which, owing to the thickness of its shell, it takes more than a light hammer to crack it." (W. R. Gerard.) The outward appearance of the nuts is similar to that of the Shell-bark, but the kernel is hardly equal to that of the Pignut Hickory.

The best way to distinguish the White Hickory in summer is by its leaves with 5 to 7 leaflets and hairy leaf-stalks. The leaflets are strongly aromatic if crushed. The twigs are usually downy to hairy, a characteristic which is helpful in recognizing it at all seasons of the year. The bark is close-fitting and furrowed, and does not shag off in plates like that of the Shag-bark Hickory. The nuts vary greatly in size, but are usually large, resembling those of the Shag-bark Hickory. The husk of the fruit is thick and 4-valved, and surrounds a globular brownish nut with a small but sweet and edible kernel. The White Hickory is an important timber tree, thriving best in rich, moist woods.

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1 = Branch with immature leaves and flowers; 2 = branch with mature leaf and fruit; 6 = a winter branchlet, slightly enlarged; 7 = section of winter branch, enlarged; 8 = section of winter branch, enlarged

GRAY BIRCH

1 = Flowering branch with immature leaves, (s) staminate flowers, (p) pistillate flowers; 2 = branch with mature leaves and fruiting strobiles; 3 = a winged seed, enlarged; 4 = a strobile scale, enlarged; 5 = a winter branch with a partly developed terminal staminate ament; 6 = section of a winter twig, enlarged

THE BIRCH FAMILY

BETULACEÆ

THE Birch Family comprises six different groups of trees and shrubs which are confined to the colder part of the northern hemisphere. All the members, even though they are separated into different groups, have some features in common. The following five groups have representatives in the United States:

Common Name	Scientific Name
1. Hazelnuts.	Corylus.
2. Hop Hornbeams.	Ostrya.
3. Hornbeams.	Carpinus.
4. Alders.	Alnus.
5. Birches.	Betula.

About thirty-five different species of Birches are known in the world. Most of them attain tree size, but a few remain shrubs. Among the fifteen species native to North America are the Paper Birch, River Birch, Black Birch, Yellow Birch, and Gray Birch.

Gray Birch

Betula populifolia *Marshall*

Family.—Birch.

Other Names.—White Birch; Oldfield Birch; Poverty Birch; Poplar Birch.

General Description.—*Shape:* narrow, pyramidal, and pointed. *Height:* 20 to 30, sometimes 45 feet. *Bark:* dull white, smooth, close-fitting, marked with black triangular blotches. *Buds:* egg-shaped, about 1/5 of an inch long, sharp-pointed, covered with 3 to 4 visible smooth brown scales. *Leaves:* alternate, simple, 2 to 3 inches long, triangular to egg-shaped, long-pointed at apex, slender-stalked. *Flowers:* appear about April; pollen-bearing and seed-bearing occur separately, but on same tree; the former occur in drooping tassels, and the latter in cylindrical spikes. *Fruit:* a slender, cylindrical cone containing numerous small winged seeds and 3-lobed bracts.

RED BIRCH

1 = Flowering branch with (s) staminate flowers, (p) pistillate flowers; 2 = branch with mature leaves and two fruiting strobiles; 3 = a winged seed, enlarged; 4 = a strobile scale, enlarged; 5 = a winter branch with three partly developed terminal staminate aments; 6 = section of a winter branch, enlarged

PREFERRED HABITAT.—Moist soil along streams, ponds, and lakes, but grows also on dry, rocky situations.

RANGE.—Nova Scotia to Lake Ontario, south to Delaware and southern Pennsylvania.

TREES with a white bark are always conspicuous. The Gray Birch has a white bark which is covered with triangular black spots located at the origin of lateral branches.

There are two distinct kinds of Birch trees with white bark native to the northeastern part of North America. The one is known as Paper Birch or Canoe Birch. The other white-barked Birch is known usually by the common names Gray Birch or White Birch. It rarely exceeds thirty-five feet in height, and its bark is close-fitting, and does not peel off readily in thin layers.

You will find no tree in the forest with a leaf like that of the Gray Birch. It is triangular in outline, tapering gradually and gracefully from a broad base to a fine long point, and the leaf margin is sharply toothed. The long slender leaf-stalks allow the leaves to be fluttered by every breeze, until the whole tree is one mass of glimmering green. The tree was happily named by Marshall *Betula populifolia*, meaning a birch with poplar-like leaves, for their trembling habit is truly characteristic of the Poplars or Aspens.

No more adaptive tree is known. It thrives along the banks of lakes and streams, and withstands the rigors and deficiencies of a dry and rugged mountain top. Its form is also easily modified by methods of treatment.

RED BIRCH

BETULA NIGRA *Linnæus*

FAMILY.—Birch.

OTHER NAMES.—River Birch; Water Birch.

GENERAL DESCRIPTION.—*Shape:* short and divided trunk, bearing rather narrow oblong and irregular crown. *Height:* 30 to 50, sometimes 100 feet, with a diameter of 5 feet. *Bark:* on old trunks dark reddish-brown and rough; on young trunks peels off in thin, film-like reddish-brown to greenish-brown papery scales. *Buds:* alternate, egg-shaped, sharp-pointed, smooth or slightly hairy. *Leaves:* alternate, small, egg-shaped, 1½ to 3 inches long, doubly serrate on margin and deep green on upper surface. *Flowers:* appear about April; pollen-bearing, arranged in drooping tassels 2 to 3 inches long; seed-producing, occur in stubby spikes about 1/3 of an inch long. *Fruit:* an erect cylindrical spike (strobile), 1 to 1½ inch long.

PREFERRED HABITAT.—Banks of streams, lakes, pools, and swamps.

RANGE.—Massachusetts to Florida, west to Minnesota, Kansas, and Texas.

THIS tree has a number of appropriate common names. It is called Red Birch because the bark on young stems and larger branches is reddish-brown to cinnamon-red in color. It peels off in thin film-like layers. If

YELLOW BIRCH

1 = Flowering branch with (s) staminate flowers, and (p) pistillate flowers; 2 = branch with mature leaves and four fruiting strobiles; 3 = a winged seed, enlarged; 6 = section of a lateral winter twig, enlarged; 7 = section of a terminal winter twig, enlarged

one recognizes the tree only once, it is seldom forgotten. River Birch and Water Birch are also appropriate names, for of all the trees that frequent river banks, swamps, and other wet places, this is perhaps the most constant.

The Red Birch is readily recognized in summer by the hairiness of its small twigs and the broadly wedge-shaped base of its leaves. It matures its fruit in early summer before any of the other native Birches.

The Red Birch is essentially a southern tree, for it reaches its largest size in the South where no other species of Birch is found. It extends northward along the principal streams, and sometimes reaches a fair size in the northern part of its range. A tree standing along the west branch of the Susquehanna River in northern Pennsylvania has a diameter of almost 4 feet.

The Red Birch is a valuable tree in landscape work. It is useful and ornamental along streams, grows rapidly, is easily transplanted, and has few insect enemies.

Yellow Birch

Betula lutea *Michaux*

Family.—Birch.

Other Names.—Silver Birch; Gray Birch.

General Description.—*Shape:* large tree with straight trunk, bearing open hemispheric crown. *Height:* 60 to 80, sometimes 100 feet, with a diameter of 4 feet. *Bark:* on old trunks rough and furrowed; on young trunks peels off in yellow, thin, film-like papery scales. *Buds:* alternate, about ¼ of an inch long, sharp-pointed, smooth, covered with reddish-brown scales. *Leaves:* alternate, simple, occur singly or in pairs but never opposite, 3 to 4 inches long, egg-shaped, and doubly serrate on margin. *Flowers:* appear about April before the leaves; pollen-bearing, occur in drooping tassels, about 3 inches long; seed-producing, occur in stubby spikes, light, red, hairy, about 2/3 of an inch long. *Fruit:* an erect, short-stalked spike (strobile) from 1 to 1½ inch long.

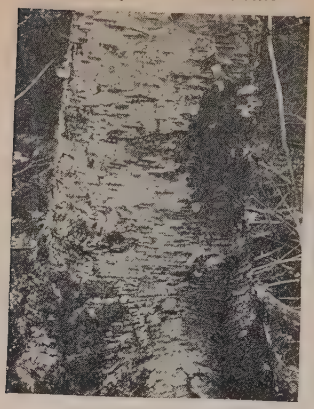
Preferred Habitat.—Moist, rich uplands, borders of streams and in swamps.

Range.—Newfoundland to Minnesota, south to Pennsylvania, and along the mountains to North Carolina and Tennessee.

The Yellow Birch is easily recognized wherever it grows by the ragged yellow bark which peels off in thin, film-like, papery scales. Its method of peeling the bark resembles that of the Paper Birch and Red Birch, but it does not have the white color of the former nor the reddish to greenish-brown color of the latter. The loose, film-like papery scales of the Red Birch are thicker and smaller than those of the Yellow Birch.

The twigs of the Yellow Birch resemble those of the Black or Sweet Birch and they have the sweet wintergreen flavor of the latter. The bark on the trunks of the closely associated Black Birch is close-fitting, blackish, cherry-like, and does not peel off in thin layers. The scales

Photo by U. S. Forest Service



CANOE BIRCH

of the fruit of Black Birch are smooth and about equally lobed, while those of the Yellow Birch are hairy and unequally lobed. The Yellow Birch is commonest upon wet situations, while the Black Birch frequents dry and rocky places.

The Yellow Birch is one of the important timber trees of the Northeastern United States. It is propagated easily, has few insect or fungous enemies, and produces valuable wood used extensively in the manufacture of furniture, flooring, boxes, veneer, fuel, pulp, and chemicals.

Canoe Birch

BETULA ALBA var. PAPYRIFERA (*Marshall*) *Spach*

FAMILY.—Birch.

OTHER NAMES.—Paper Birch; White Birch; Gray Birch; Golden Birch.

GENERAL DESCRIPTION.—*Shape:* short-trunked, bearing a narrow, open crown. *Height:* 50 to 75, sometimes 80 feet, with a diameter of 3 feet. *Bark:* chalky to creamy white, tinged with yellow, and peeling off in thin, film-like layers. *Buds:* alternate, egg-shaped, sharp-pointed, dark chestnut-brown, about ¼ of an inch long. *Leaves:* alternate, simple, oval, 2 to 3 inches long, and finely toothed on margin. *Flowers:* appear about April before the leaves; pollen-bearing, arranged in drooping tassels, 3 to 4 inches long; seed-producing; occur in bright red, erect clusters about 1 inch long. *Fruit:* a short-stalked, cylindrical spike, about 1½ inch long.

PREFERRED HABITAT.—Rich wooded slopes, borders of lakes, swamps, and streams; frequently mixed with other hardwood trees and occasionally with evergreens.

RANGE.—Newfoundland to Alaska, south to Pennsylvania, Michigan, Colorado, and Washington.

THE Canoe Birch, also known as Paper Birch and White Birch, is a northern tree. It extends south only as far as northern Pennsylvania, but reaches across the entire continent from Newfoundland to Alaska.

It is very abundant in the great forest region of Canada and the northern United States, where it frequents the banks of lakes and rivers and is regarded as one of our most beautiful and characteristic trees.

The Canoe Birch is one of the best-known trees in its range. Every school-child knows that the bark of this tree was used in the building of canoes by the Indians and early settlers, and everyone who has had the privilege to roam through the Northwoods will forever remember its chalky to creamy white bark that peels off in thin film-like layers.

In addition to its white and loosely-peeling bark, this Birch may be recognized by its broadly oval leaves with short, stout leaf-stalks, which

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1 = Flowering branch with immature leaves, (s) staminate flowers, (p) pistillate flowers; 2 = branch with mature leaves, fruiting strobiles, and partly developed staminate aments; 3 = a winged seed, enlarged; 4 = a strobile scale, enlarged; 5 = a winter branch with three partly developed terminal staminate aments; 6 = section of a lateral winter spur-branch, enlarged; 7 = section of a terminal winter branch, enlarged

are smooth or covered with only a few hairs. The fruiting spikes are short-stalked, cylindrical, and usually droop, while those of the other Birches generally stand erect. The Canoe Birch is not so abundant in specimens as the Gray Birch, but it reaches a larger size, produces better wood, and becomes far more attractive.

THE BEECH FAMILY

FAGACEÆ

ALTHOUGH the Beeches, Chestnuts, and Oaks represent three different groups of trees, they all belong to the Beech Family, which contains some of the most important timber trees of North America, and has representatives in nearly all parts of the world. They yield not only high grade wood, but also supply large quantities of cork, and tanning and dyeing materials, and furnish much food for birds and other animals.

About 600 species of trees and shrubs are found in the world which belong to the Beech Family, of which number sixty are native to North America, and are usually grouped in the following five classes:

Common Name	Scientific Name
1. The Beeches.	Fagus.
2. The Chestnuts.	Castanea.
3. The Oaks.	Quercus.
4. The Tanbark Oaks.	Pasania.
5. The Western Chinquapins.	Castanopsis.

THE BEECHES

Fagus

There are in all five species of Beech in the world, three of which are native to Asia, one to Europe, and one to America. Their distribution is limited to the northern hemisphere,

whence they form some of the most attractive natural and cultural forests known to man.

The European Beech (Fagus sylvatica) is one of the most important forest trees of continental Europe. Pure stands of this tree are common in Belgium, Denmark, Germany, and northern France, where thousands of acres were destroyed during the recent war by the contending armies. A number of ornamental varieties of this species have been developed and extensively introduced into the United States, viz.: the Weeping Beech, Purple Beech, and Cut-leaf Beech so common in our gardens, lawns, and parks. This species with its many varieties figured greatly in ancient literature, and now plays an important rôle in scientific forestry of Continental Europe.

The Beeches as a group are elegantly groomed in winter and beautifully clad in summer. The nuts produced by them furnish a nutritious article of food, which was extensively used by man for food in ancient times and during the World War. Formerly an oil was extracted from the nuts and widely used in lamps and for cooking. The leaves when green furnish forage for cattle, and when dry are used to fill mattresses and for stable litter.

Beech wood is extremely valuable as lumber and unsurpassed as a fuel-wood, especially when used in fireplaces. In Continental Europe it is prized so highly that the peasants gladly and zealously collect the twigs and small branches and convey them to their homes where they are used as fuel. Such an intensive and complete utilization of all parts of the tree, in part accounts for their attractive and clean forests, which stand in strong contrast with some of our American debris-laden and unclean forest areas.

IRON-WOOD

1 = Flowering branch with immature leaves, (s) staminate flowers, (p) pistillate flowers; 2 = branch with mature leaves and hop-like fruit clusters; 3 = a seed with inclosing membrane removed, slightly enlarged; 4 = a seed with part of inclosing membrance removed, slightly enlarged; 5 = a winter branch with partly developed terminal staminate aments; 6 = section of winter twig, enlarged

Iron-wood

Ostrya virginiana (*Miller*) *K. Koch*

Family.—Birch.

Other Names.—Hop Hornbeam; Leverwood; Deerwood.

General Description.—*Shape:* very broad and wide-spreading crown, with drooping branches. *Height:* 20 to 30, sometimes 60 feet, with a diameter of 1½ foot. *Bark:* alternate, slightly hairy, egg-shaped, sharp-pointed, about ¼ of an inch long. *Leaves:* alternate, simple, egg-shaped, 3 to 5 inches long, finely serrate on margin, and dull yellowish-green on upper surface. *Flowers:* appear about April with the leaves; pollen-bearing, arranged in drooping tassels about 2 inches long; fruit-producing, appear in erect spikes, each one inclosed in a hairy, bladder-like bract. *Fruit:* a small, flat nutlet, inclosed in an inflated bladder-like bract.

Preferred Habitat.—Dry, gravelly slopes and ridges.

Range.—Cape Breton Island to Florida, west to Minnesota and Texas.

The Iron-wood is distributed widely over the eastern United States but is not abundant in any part of its range. It usually occurs solitary and is commonly found in the understory of the forest.

It can readily be recognized by its thin, grayish-brown bark, which peels off into narrow, flat scales, which are often loose at both ends and attached only in the middle. The hop-like grouping of the fruit, which appear like a cluster of little sacks, is very distinctive. The fruit sacks usually drop to the ground before winter, but the stalks to which they are attached often hang on for a while.

Few trees have such fine interlacing branches, that are displayed so clearly in winter. Another winter characteristic is the pollen-bearing catkins, which are about ½ an inch long and usually occur in threes at the end of the twigs. The small 2-ranked leaf-scars with 3 bundle-scars and the small reddish-brown buds with 4-ranked scales are also helpful distinguishing features in winter.

It would be difficult to find leaves of more beautiful texture than those of the Iron-wood. Their autumnal color is distinctly yellow, while those of the closely-related American Hornbeam are orange to deep scarlet.

The wood is heavy, hard, strong, and durable. It is about 30 per cent. stronger than White Oak, and is used for fence-posts, tool-handles, and mallets.

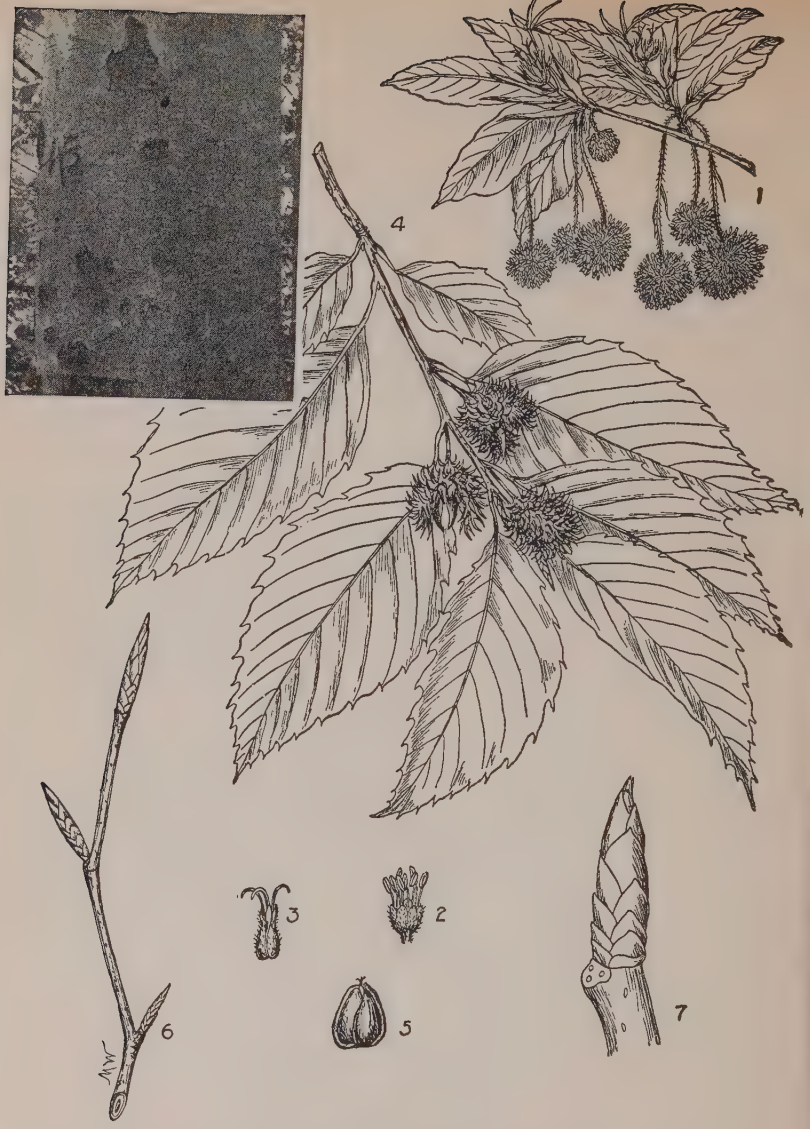
Beech

Fagus grandifolia *Ehrhart*

Family.—Beech.

Other Names.—American Beech; Red Beech; White Beech.

General Description.—*Shape:* in open places crown is dense, high, conical, and symmetrical; in dense stands trunk is long and clean, and crown shallow and narrow. *Height:* usually 50 to 80 feet, sometimes 125 feet. *Bark:* tight-fitting, smooth, light gray,



BEECH

1 = Branch with staminate and pistillate flowers and immature leaves; 2 = a staminate flower, enlarged; 3 = a pistillate flower, enlarged; 4 = a branch with mature leaves and three fruits; 5 = a seed, natural size; 6 = a winter branch with long, slender, and sharp-pointed buds; 7 = terminal section of a winter branch with long, slender, and sharp-pointed buds, covered with many overlapping scales, slightly enlarged

mottled with dark spots. *Buds:* five times as long as wide, slender, conical, sharp-pointed, covered by 10 to 20 reddish-brown scales. *Leaves:* alternate, simple, 3 to 4 inches long, stiff, straight-veined, with pointed apex and sharp-toothed margin. *Flowers:* appear in April and May; pollen-bearing occur in stalked ball-like heads one inch in diameter; pistillate (female) occur in two-flowered clusters in leaf axils. *Fruit:* a stalked, prickly, four-valved bur, containing triangular brown nuts, maturing in September and October.

PREFERRED HABITAT.—Common on rich, moist bottomlands, also thrives in rich, gravelly and moist uplands. Endures dense shade.

RANGE.—Nova Scotia to Ontario and Wisconsin, south to Florida and Texas.

THERE is only one Beech native to America. Its features are so striking and so different from other trees that it may be recognized very easily, and when once known will not be forgotten. One distinctive characteristic is present throughout the entire year and may be relied upon under all conditions of growth, namely, the quaker-gray, close-fitting, and smooth bark, upon which the American youth has been cutting his initials and other outline carvings.

It is, however, not necessary to rely on a single distinguishing characteristic, for even in the midst of winter other striking features are at hand. The slender, sharp-pointed, conical winter-buds, three-quarters to one inch long and covered with ten to twenty reddish-brown scales, cannot be confused with those of any other native tree.

The ovate and stiff leaves with straight veins and coarsely serrate margins are also distinctive. The wood produced by the Beech is by no means the best upon the market, but it is probably employed more extensively in the manufacture of different articles used in the household than any other wood.

From early to late autumn the Beech, next to the Chestnut, is the most frequented of all the native trees. It produces an edible nut prized by man, and by squirrels, blue-jays, and many other domestic and wild animals.

THE CHESTNUTS

CASTANEA

There are five different species of Chestnut in the world, four of which reach tree-size and one remains a shrub. They occur only in the northern hemisphere, where they are widely distributed in eastern North America, southern Europe, northern Africa, western Asia, and central and northern China and Japan.

CHESTNUT

1 = Branch with staminate and pistillate flowers and mature leaves; 2 = a staminate flower, enlarged; 3 = a pistillate flower, enlarged; 4 = a branch with a cluster of closed and open burs; 5 = a nut; 6 = a winter branch; 7 = a section of winter branch, enlarged

The Sweet Chestnut of southern Europe reaches an enormous size and attains a great age. The world-famous specimen of this species known as the "Chestnut of a Hundred Horsemen," on Mt. Ætna in Sicily, while probably an aggregate of five trees, had a circumference of 200 feet. Some other specimens of this same species reached an estimated age of 1,000 years. The natural occurrence of the Sweet Chestnut in southern Europe serves as a valuable guide to land-owners in locating vineyards, for one is safe in planting grapes only as far north and to as high an altitude as the chestnut grows, and if these limits are exceeded, frost is sure to interfere with their establishment and development.

The Chestnut Blight, which was imported from China and began its reign of conquest about 1907 in the vicinity of New York City, has already done irreparable damage to the Chestnut forests of the eastern United States.

Three species of Chestnut are native to eastern North America, two of which attain tree-size, and one (*Castane alinfolia*) seldom exceeds three feet in height, and is native to the south Atlantic States. The two species which attain tree-size are the Common Chestnut and the Chinquapin. The latter yields delicious small nuts, and in the northern part of its range in Pennsylvania seldom exceeds twenty feet in height, while it reaches a height of fifty feet in the Southern States.

Chestnut

Castanea dentata (*Marshall*) *Borkenhausen*

Family.—Beech.

General Description.—*Shape:* in open places trunk is short and crown high and widespreading; in dense stands long clean trunks bear shallow and narrow crown. *Height:* sometimes 140, usually 60 to 100 feet. *Diameter:* often 4 to 5 feet, rarely over 10 feet. *Bark:* on old trunks grayish-brown, deeply furrowed; on branches and small trunks smooth, brownish, close-fitting. *Buds:* alternate, egg-shaped, ¼ of an inch long, blunt-pointed, covered by 2 or 3 chestnut brown scales. *Leaves:* alternate, simple, 6 to 8 inches long, sharp-pointed at apex, wedge-shaped at base, toothed on margin. *Flowers:* appear in June or July; pollen-bearing clustered in long drooping tassels and pistillate (female) occur in small groups along base of tassels. *Fruit:* a prickly bur containing 1 to 5 brown nuts, maturing in September or October.

PREFERRED HABITAT.—Grows on almost any kind of soil from bottom-lands to mountain tops, but dislikes limestone and extremely wet soil.

RANGE.—Maine to Michigan and Arkansas, south to Delaware, and along mountains southward to Alabama and Mississippi.

THE native Chestnut is one of the best known and most valuable timber trees of eastern North America. It is not difficult to distinguish at any season of the year. The ashy-gray, fibrous, and deeply furrowed bark on old trunks is very distinctive, and the smooth brownish twigs marked with scattered light dots are also helpful in identifying it.

In summer the leaves, which are about six to eight inches long, sharp-pointed, and coarsely serrate on the margin, are a ready means of identification. About the fourth of July the Chestnut bursts forth in cream-colored blossoms, and becomes the most conspicuous feature of the landscape.

The nuts which the Chestnut tree yields are by no means the least distinctive product of this tree. They are prized highly by man, and many wild animals treasure them above all other products of the forest. The nuts are inclosed in a prickly bur, which may be nature's way of protecting them until ripe.

The wood of the Chestnut is extremely durable, especially when placed in contact with the soil. It is a valuable wood for telegraph and telephone poles, railroad ties, mine props, fence posts, and fence rails.

THE OAKS

QUERCUS

The Oaks are world famous on account of their wide distribution, physical sturdiness, great strength, and the high commercial value of their wood, which has a wide range of uses. Most of them attain a great age, and reach a large size. The lives of some European species is believed to reach 1,000 years, while a few American specimens have been found which exceeded 500 years.

The value of the Oaks has been appreciated for many centuries. The ancients worshiped them, and Socrates regarded the Oak as the "tree of knowledge." They are closely associated with the history and literature of England, where they are famous in prose and poetry alike. The early Britons, as

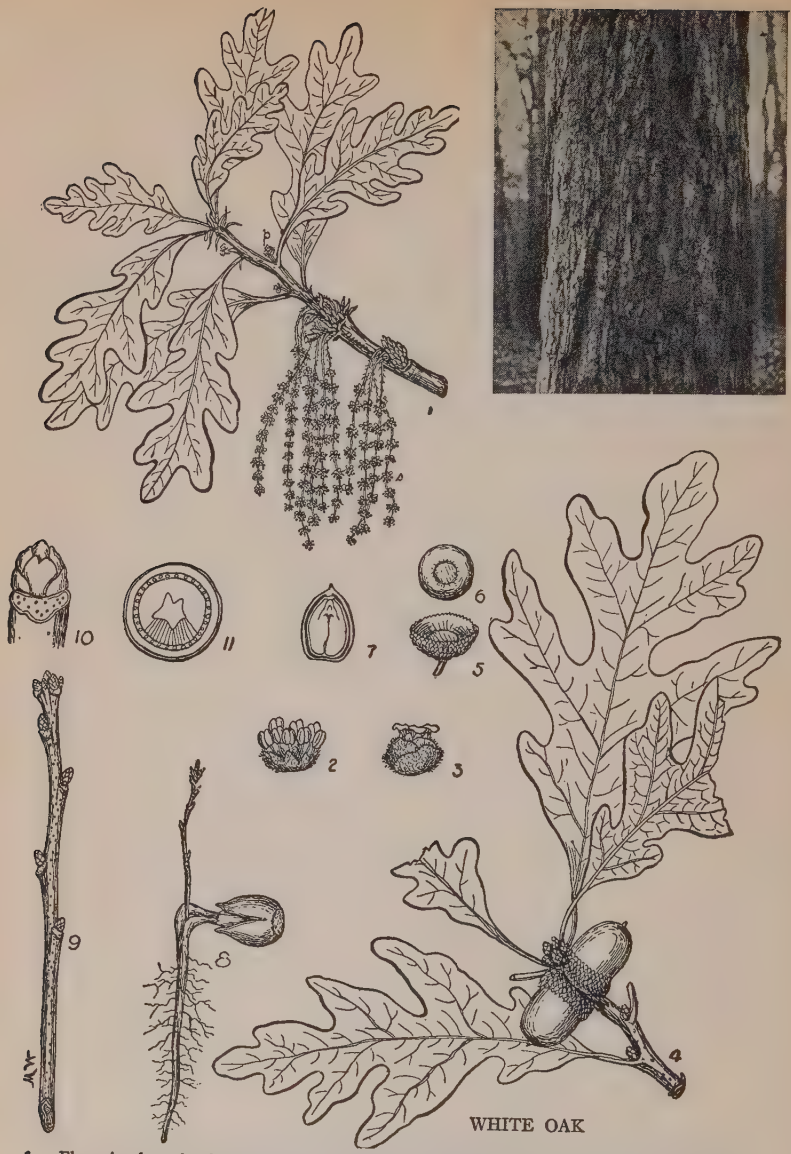
well as the later conquerors, comprenended their real worth and value. In America, the Charter Oak holds a prominent and lasting place in our colonial history.

Every woodsman and forester loves the American Oaks. They are attractive at all seasons of the year, whether in the first pale dress of spring tinged with delicate pink, or the deeper tones of summer; the rich purple, scarlet, or red of autumn, or the dull brown of Indian summer; perhaps they are most beautiful and picturesque in winter, when free from their foliage, and with their stout and gnarled branches standing out in picturesque outline against the sky.

The American Oaks are equally as attractive as their European brethren, and of far greater commercial value. Their wood has a wide range of uses, and the kernel of the nuts of some of them is edible. The Indians, and even the early white settlers, used the white oak acorns for food. During the World War all the seeds produced by the Oaks, Beech, and Chestnut throughout Continental Europe and Great Britain were used by man. They furnished food for the family and nourishment for domestic animals. In olden days it was an established practice to fatten hogs on fallen acorns and beech nuts. In some forests as many as 20,000 hogs were fattened in one year. The bark of a few species, particularly Rock Oak, is rich in tannin, which is used in the manufacture of tannic acid and the preparation of leather. The inner bark of the Black Oak is locally manufactured into a yellow dye employed in the preparation of various cloths, particularly khaki. Large quantities of this bark were harvested during the recent war, and helped to overcome the great shortage of domestic raw dye material felt so keenly everywhere.

Of the 300 species of Oaks which are known in the world, fifty-five species are native to North America. The latter are usually divided into three groups:

1. *White Oaks*, which mature their acorns in one year, and have leaves with rounded lobes.



1 = Flowering branch with immature leaves, (s) staminate blossoms, (p) pistillate blossoms; 2 = a staminate flower, enlarged; 3 = a pistillate flower, enlarged; 4 = branch with mature leaves and mature acorns; 5 = acorn cup; 6 = acorn, basal view; 7 = longitudinal section of acorn, showing embryo; 8 = germinating acorn with its young root and shoot; 9 = winter branch; 10 = terminal section of winter branch showing bud with overlapping scales, a leaf-scar with bundle-scars, and lenticels, enlarged; 11 = cross-section of twig showing pentangular pith, wood with conspicuous medullary rays, inner and outer bark, enlarged

2. *Black Oaks*, which mature their acorns in two years, and have leaves with bristle-pointed lobes.

3. *Evergreen* or *Live Oaks*, which retain their leaves for two or three seasons, while the leaves of the other Oaks persist only for one season.

White Oak

Quercus alba *Linnæus*

Family.—Beech.

General Description.—*Shape:* tall, broad, round-topped. *Height:* sometimes 150 feet. *Age:* rarely over 500 years. *Bark:* light gray, scaly. *Pith:* star-shaped. *Buds:* alternate, reddish-brown, egg-shaped, 1/8 of an inch long. *Leaves:* alternate, simple, 5 to 9 inches long, 2 to 4 inches wide, usually seven-lobed. *Flowers:* appear in April and May; pollen-bearing are yellowish and occur in drooping tassels; pistillate (female) are reddish, and occur on short stalks on new growth. *Fruit:* an acorn maturing in one season and ripening in September and October; nut light brown, ¾ of an inch long; cup scaly and inclosing ¼ of nut.

Preferred Habitat.—Tolerates many soils, but prefers rich and moist situations.

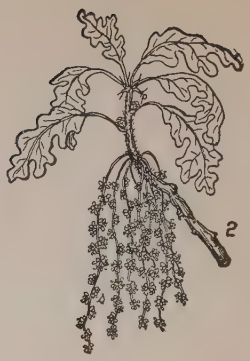
Range.—Maine to Minnesota, and south to Florida.

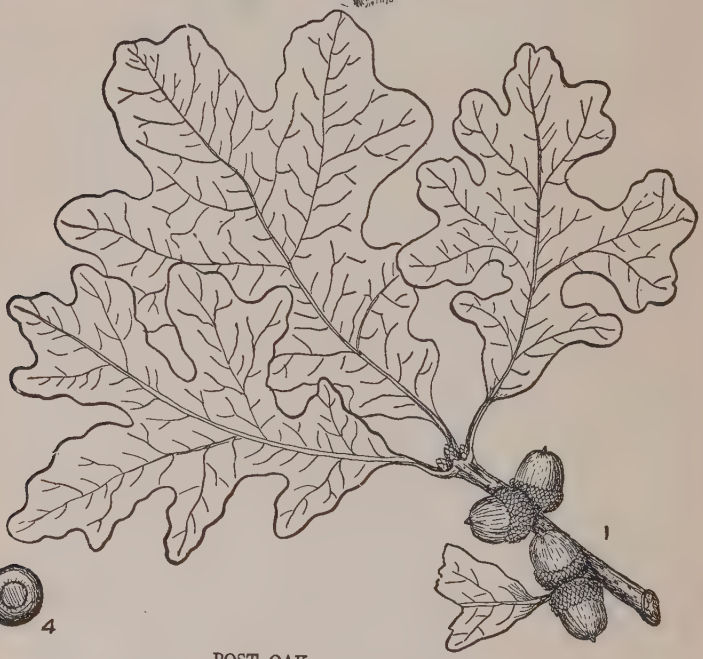
The White Oak is the most important hardwood timber tree in eastern North America. Its wood is the most valuable of all the Oaks. It is ashy-gray in color, close-grained, hard, tough, durable, and weighs about forty-six pounds per cubic foot. No other wood has so wide a range of uses.

In summer the White Oak can be distinguished readily by its loose, scaly, grayish-white bark, and by its deeply round-lobed and obovate leaves. The leaves of all the members of the Black Oak group are bristle-tipped, and the other members of the White Oak group have leaves with shallow indentations, or differ from the true White Oak in form.

In winter this tree can be distinguished by its rather small reddish-brown and blunt-pointed buds. The Swamp White Oak has slender reddish to grayish twigs and dark loose-peeling flakes of bark on the branches; the Post Oak has greenish rusty pubescence on the twigs; and the Bur Oak has corky winged projections on the bark of the small branches, and the cups of the acorns are fringed along the margin.

The foregoing characteristics should enable even the amateur tree-student to distinguish the White Oak, so common in the forest and wood-lot, from all other trees.





POST OAK

1 = Branch with mature leaves and mature acorns; 2 = flowering branch with immature leaves, (s) staminate blossoms, (p) pistillate blossoms; 3 = an acorn cup; 4 = an acorn, basal view; 6 = winter branch covered with a dense rusty pubescence; 7 = section of winter branch showing slightly pubescent buds, leaf-scars with bundle-scars, lenticels, and the dense rusty pubescent bark, natural size

Post Oak

QUERCUS STELLATA *Wangenheim*

FAMILY.—Beech.

OTHER NAME.—Iron Oak.

GENERAL DESCRIPTION.—*Shape:* short, stout trunk, bearing a dense, broad and round-shaped crown. *Height:* 60 to 80, sometimes 90 feet, with a diameter of 4 feet. *Bark:* resembles that of White Oak, only darker, somewhat rougher and less scaly. *Buds:* alternate, about 1/8 of an inch long, stubby, sometimes as broad as long, covered with reddish-brown hairy scales. *Leaves:* alternate, simple, 4 to 7 inches long, 3 to 5 inches wide, thick, leathery, generally 5-lobed; coated with rusty hairs on lower surface. *Flowers:* appear about May; pollen-bearing, arranged in slender drooping tassels 4 to 6 inches long. *Fruit:* an acorn maturing at the end of the first season. Nut ½ to ¾ of an inch long.

PREFERRED HABITAT.—Dry, rocky soil. Occurs also on gravelly uplands, limestone hills, and sandy plains.

RANGE.—Massachusetts, Central Pennsylvania, Kansas to Florida and Texas.

IT is easy to recognize the Post Oak in summer by the peculiar form of its leaves, which have large rounded or squarish lobes. The three terminal lobes are the largest, and the basal lobes taken together are wedge-shaped. These unusual features give the distinctive appearance to the leaves. The rigid leathery texture of the leaves, and their shiny green upper surface and rusty and hairy lower surface, are also helpful in recognizing this tree. An examination of the lower surface of the leaves with a magnifying glass shows that the hairs are star-shaped, whence the technical name, *stellata*.

In winter the Post Oak may be recognized by its short, blunt-pointed buds and its stout, rusty, and hairy twigs. The buds are about the same size as those of the White Oak, but brighter reddish in color.

In the northern part of its range it is a comparatively small tree, but in the lower Mississippi Valley, where it reaches its best development, it reaches a large size, and locally is the commonest member of the Oak forests.

The wood is firm and very hard, which may have given it the name Iron Oak. It decays slowly when placed in contact with the ground, which accounts for its extensive use for fence posts Presumably, this use gave the tree its common name—Post Oak.

The Post Oak belongs to the White Oak group, for its leaves are not bristle-tipped but are round-lobed, and its acorns mature in one season. It is a valuable forest tree in the Mississippi Valley, but has few qualities to recommend it for ornamental planting.

BUR OAK

Bur Oak

Quercus macrocarpa *Michaux*

Family.—Beech.

Other Names.—Over-cup Oak; Mossy-cup Oak.

General Description.—*Shape:* heavy and straight-trunked with broad, round-topped crown, composed of heavy spreading branches. Height: 70 to 80, sometimes 170 feet, with a diameter of 6 to 7 feet. *Bark:* on trunks ranges between flakey bark of White Oak and roughly-ridged bark of Chestnut Oak. *Buds:* alternate, about ¼ of an inch long, reddish-brown, slightly hairy. *Leaves:* alternate, simple, 6 to 12 inches long, 3 to 6 inches wide, 5 to 7 lobed; lobes separated by deep, round base clefts. *Flowers:* mature about May; pollen-bearing, arranged in slender drooping tassels, 4 to 6 inches long. *Fruit:* an acorn maturing at the end of first season; nut ¾ of an inch to 2 inches long, covered with fine hairs; acorn-cup light brown, covered with large scales which form a distinct fringe along the margin.

Preferred Habitat.—Low, rich bottom-lands.

Range.—Nova Scotia to Manitoba, south to Pennsylvania, Kansas, and Texas.

None of the Oaks have more striking distinguishing characteristics than the Bur Oak. It is called Mossy-Cup Oak, for the acorn-cups are fringed along the margin to such an extent that they resemble moss. They are the most unique of all the acorn-cups. Some trees in the Mississippi Valley develop such large acorn-cups that they are called "Bird-nest Cups."

The leaves are fully as distinctive as the acorn-cups are unique. On each side and near the middle of the leaf occurs a deep, rounded cleft which reaches almost to the midrib and divides the leaves into two parts. The terminal part of the leaf has large squarish lobes and the basal part is more or less triangular.

The twigs are fully as distinctive as the acorn-cups and the leaves. They are stout, yellowish-brown, and sometimes marked with corky-winged projections standing out from the twigs from 1 to 1½ inch. This characteristic is possessed by only a few trees, such as the Cork Elm, Sweet Gum, and several other species.

The Bur Oak is one of the very largest of the American Oaks. It has a wide distribution, attains a large size, and produces valuable wood. It is a very attractive ornamental and shade tree. It is easy to transplant, grows fast, develops an excellent form, withstands smoke better than most of the Oaks, and has few insect enemies.

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1 = Flowering branch with immature leaves, (s) staminate blossoms, (p) pistillate blossoms; 2 = branch with mature leaves and mature acorns; 3 = an acorn cup; 4 = an acorn; 5 = a winter branch showing buds, leaf-scars, and raised corky ridges; 6 = terminal section of winter branch showing buds with overlapping scales and leaf-scar with bundle-scar, enlarged; 7 = basal bud-scale with hairy margin, enlarged; 8 = apical bud-scale with hairy serrate margin, enlarged

CHESTNUT OAK

Chestnut Oak

Quercus prinus *Linnæus*

Family.—Beech.

Other Names.—Rock Oak; Rock Chestnut Oak.

General Description.—*Shape:* straight, continuous, heavy trunk, bearing a broad, open crown. *Height:* 60 to 70, sometimes 100 feet, with a diameter of 6 to 7 feet. *Bark:* on old trunks brown to black, very rough, deeply furrowed, and rich in tannin. *Buds:* alternate, ¼ to ½ of an inch long, sharp-pointed, covered with light chestnut-brown scales. *Leaves:* alternate, simple, 5 to 9 inches long, 2 to 4 inches wide, coarsely-toothed on margin. *Flowers:* appear about May, when leaves are a third developed; pollen-bearing, are yellow and occur in drooping tassels, 2 to 3 inches long. *Fruit:* short-stalked acorn maturing in one season; nut sometimes 1½ inch long, usually 2 to 3 times as long as broad; acorn-cup thin, hemispheric, hairy inside, and covers 1/3 of nut.

Preferred Habitat.—Dry hillsides and moist, fertile foot-hills.

Range.—Maine to Ontario, south to Alabama and Tennessee.

The name Chestnut Oak was given to this tree because its leaves resemble those of the common Chestnut, a fact which enables one to recognize it at a glance.

It belongs to the White Oak group, the members of which are recognized by their round-lobed leaves and the fact that their acorns mature in one season, while the Oaks belonging to the Black Oak group mature their acorns in two seasons.

The Chestnut Oak may be distinguished at any season of the year by its bark. On young stems it is smooth, thin, and yellowish brown. On old trunks it is thick, brown to black, and deeply furrowed. The ridges between the furrows are sharp-angled, solid, and not scaly. The bottom of the furrows is often cinnamon-red in color, a characteristic not found in any other Oak.

In winter the Chestnut Oak can always be distinguished by its slender, angular, orange-brown twigs terminated by a cluster of light-brown, sharp-pointed buds, about ¼ to ½ of an inch long.

The Chestnut Oak is also called Rock Oak; a name probably given to it on account of the hard wood it produces or the rocky situations upon which it usually occurs. It is an important forest tree, for it grows rather rapidly, produces valuable wood, and yields bark which is rich in tannin.

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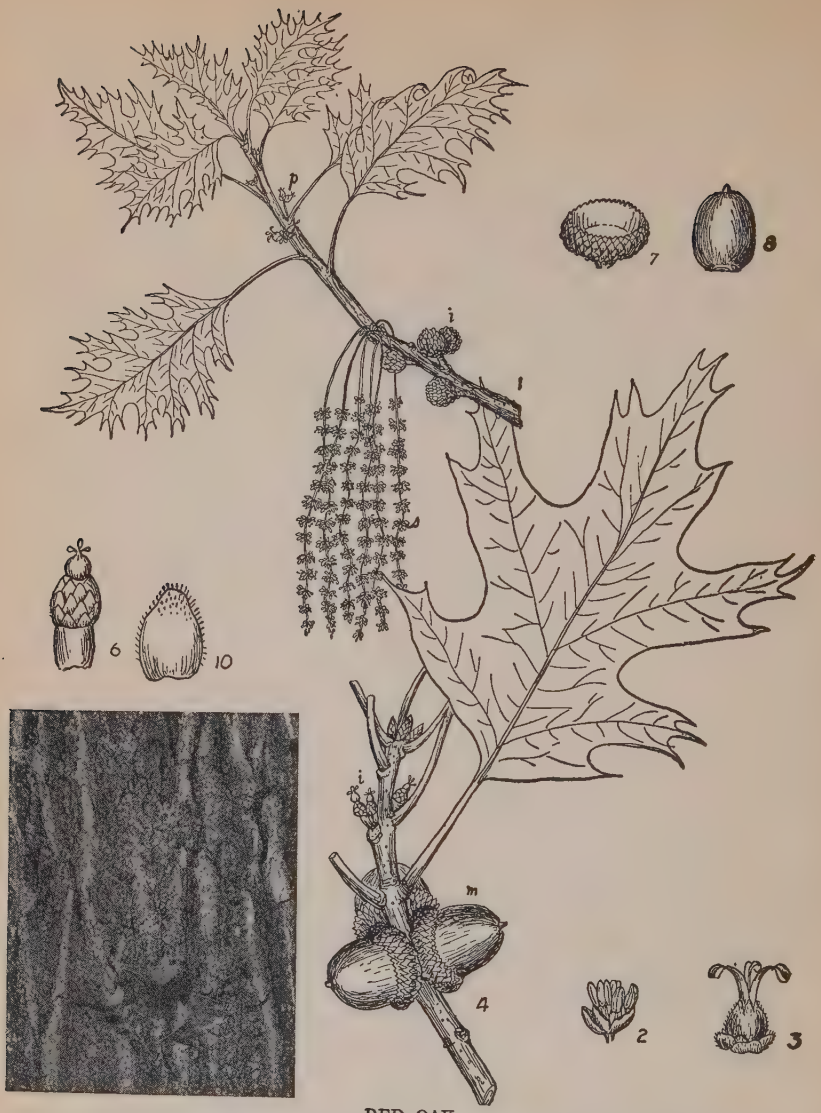
1 = Flowering branch with immature leaves, (s) staminate blossoms, (p) pistillate blossoms; 2 = branch with mature leaves and mature acorns; 3 = an acorn cup; 4 = an acorn; 9 = an apical bud-scale with hairy margin, enlarged.



RED OAK

1 = Flowering branch with immature leaves, (s) staminate blossoms (p) pistillate blossoms; 2 = a staminate flower, enlarged; 3 = a pistillate flower, enlarged; 4 = branch with mature leaves, (i) immature acorns, (m) mature acorns; 6 = an immature acorn, enlarged; 7 = an acorn cup; 8 = an acorn; 10 = a bud-scale, enlarged

Red Oak

Quercus rubra *Linnæus*

Family.—Beech.

General Description.—*Shape:* When grown in the open, trunk is short, and crown broad and symmetrical; in dense stands trunk is straight, clean and continuous, and the crown shallow and narrow. *Height:* sometimes 150 feet. *Age:* frequently becomes 300 and occasionally 400 years. *Bark:* on large trunks thick, dark-brown, furrowed, with flat-topped ridges; on small trunks and branches smooth and grayish-brown. *Pith:* star-shaped. *Buds:* alternate, reddish-brown, sharp-pointed, ¼ of an inch long. *Leaves:* alternate, simple, 5 to 9 inches long, 4 to 6 inches wide, with 7 to 9 bristle-tipped lobes. *Flowers:* appear in April and May; pollen-bearing are yellowish and occur in drooping tassels about 4 inches long; pistillate (female) are reddish, and occur in short-stalked clusters on new growth. *Fruit:* large acorn maturing in two seasons and ripening in September and October; cup wide and shallow; nut large, egg-shaped and light brown.

Preferred Habitat.—Occurs on a wide range of situations, but prefers porous, sandy or gravelly soil.

Range.—Found from Nova Scotia to Minnesota and Kansas, and south to Florida and Texas.

The Red Oak is one of the stateliest, cleanest, and handsomest hardwood trees in America.

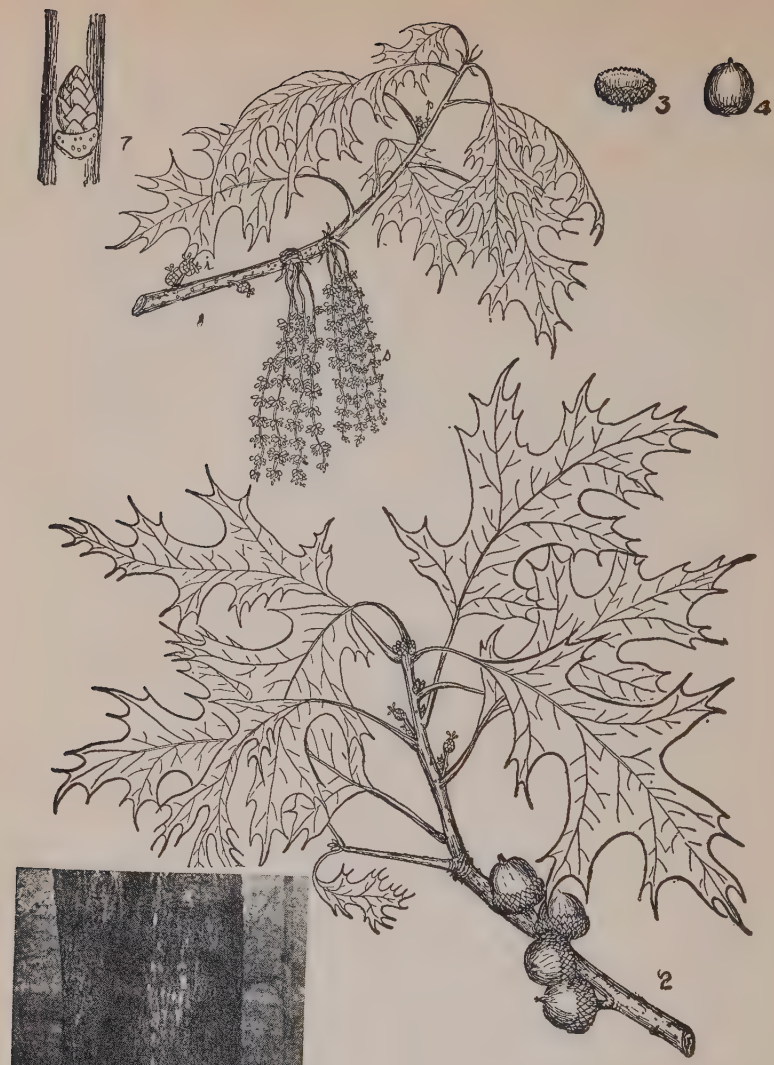
It is one of the most distinctive of the Oaks, and may be recognized by its large dull-green leaves, with reddish midribs and triangular ascending lobes terminated by bristle tips. The bark on old trunk is very characteristic, having smooth and shiny plateau-like plates between the furrowed depressions.

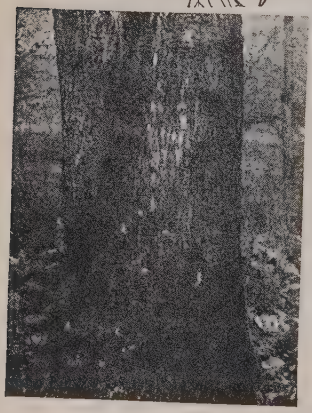
The lateral branches are straight, clean, and smooth, and form an angle of about forty-five degrees with the main stem. The winter buds are very distinctive, being reddish-brown in color, sharp-pointed, and covered with many overlapping smooth scales. The acorns cannot easily be confused with those of any other of the Oaks, for the cups are broad and shallow and the nut large, ovoid, and bright brown.

The wood is heavy, hard, strong, light reddish-brown, and weighs about forty-one pounds per cubic foot.

The Red Oak is one of our most important timber trees. It surpasses all other Oaks in height, diameter, and volume growth, and will thrive on a great variety of soils.

It is the most highly prized of all the American Oaks introduced in Europe, where it has been planted extensively in Belgium, England, and Germany since 1740. It has the widest distribution in the German forests of any American hardwood tree. In the state of Baden alone over 450 acres have been restocked with this tree, and some of these stands are almost one hundred years old.





PIN OAK

1 = Flowering branch with immature leaves, (s) staminate blossoms, (p) pistillate blossoms, (i) immature acorns; 2 = branch with mature leaves, immature and mature acorns; 3 = an acorn cup; 4 = an acorn; 7 = section of a winter branch, enlarged

Pin Oak

Quercus palustris *Muench*

Family.—Beech.

Other Names.—Swamp Oak; Swamp Spanish Oak; Water Oak.

General Description.—*Shape:* straight, clean and continuous trunk bearing a symmetrical conic crown. *Height:* 50 to 60, and sometimes 120 feet, with a diameter of 3 feet. *Bark:* on old trunks rather smooth or slightly roughened; on young trunks shining, very smooth, light brown to reddish. *Buds:* alternate, smooth, 1/3 of an inch long, sharp-pointed, covered with light-brown scales, and clustered at the end of the branches. *Leaves:* alternate, simple, 4 to 6 inches long, 2 to 4 inches wide, 5 to 9 lobed; lobes bristle-pointed, separated by broad, deep, round-based clefts. *Flowers:* appear about May when leaves are 1/3 developed; pollen-bearing occur in slender hairy tassels from 2 to 3 inches long. *Fruit:* an acorn maturing at the end of the second season; nut round, light brown, about ½ of an inch long; acorn is thin, saucer-shaped, shallow, ½ of an inch across, and incloses about 2/5 of nut.

Preferred Habitat.—Rich, moist soil. Common on river bottom-land, along streams, and on border of lakes.

Range.—Massachusetts to Michigan and Missouri, south to Virginia, Tennessee, and Oklahoma.

The Pin Oak is one of the most attractive and graceful Oaks native to the United States. It is planted extensively as a shade, park and avenue tree on account of its rapid growth, distinctive form, attractive foliage, and the ease with which it may be transplanted.

Its preference for low ground and wet places is shown in its common names, Swamp Oak and Water Oak, and in the specific part of its technical name, *palustris*, which means plains or lowlands.

When young and if grown in the open, Pin Oak trees have a distinctive form. It is easy to recognize them at a great distance. The trunk is smooth and continuous. It does not divide and branch as do the trunks of other Oaks. Its lateral branches are slender and relatively short. The lower ones droop, the upper ones stand erect, while those in the middle stand out almost at right-angles to the main stem.

A close examination of its twigs will reveal some striking characteristics. They are usually beset with short, stiff, pin-like spurs, which are responsible for the name Pin Oak. Its small, smooth, sharp-pointed, light-brown buds, and its small, light-brown acorns with shallow cup inclosing one-third of the nut, are also distinguishing characteristics.

BLACK OAK

Black Oak

Quercus velutina *Lambert*

Family.—Beech.

Other Names.—Yellow Oak; Quercitron.

General Description.—*Shape:* narrow to widespreading; irregular, and oblong. *Height:* 60 to 80, sometimes 150 feet, with a diameter of 4½ feet. *Bark:* on young trunks smooth and dark brown; on old trunks thick, rough, and black. Inner bark is yellow and bitter. *Buds:* alternate, 1/3 to ½ of an inch long, strongly angular, and hairy. *Leaves;* alternate, simple, 4 to 6 inches long, 3 to 4 inches wide, usually 7-lobed; each lobe is terminated by bristle points. *Flowers:* appear about May; pollen-bearing, occur in tassels 4 to 6 inches long; pistillate borne solitary or in small groups on short stalks on new growth. *Fruit:* an acorn with an ovate, light, reddish-brown nut, ½ to 1 inch long, contained in a thin, dark, reddish-brown and scaly cup which embraces half of nut.

Preferred Habitat.—Dry uplands, gravelly plains, and ridges.

Range.—Maine to Western Ontario, and south to Florida and Texas.

This tree has a number of appropriate common names. The name Black Oak refers to the color of the bark on old trunks. It is also called Yellow Oak on account of the yellow inner bark which is always present and a never-failing characteristic.

Before the era of modern dyes the yellow inner bark of Black Oak was used extensively in the manufacture of a yellow dye known as Quercitron During the World War, when the dye situation was critical, the Black Oak dye business was revived. Many thousands of cords were harvested and manufactured into a vegetable dye used in the dyeing of khaki cloth.

The leaves of Black Oak probably vary more widely in size and form than those of any other oak. The normal leaves are from 4 to 6 inches long, but exceptional leaves become 12 to 16 inches long. All types of leaves, ranging from the deep-lobed form of the Scarlet Oak to the shallow-lobed form of the Red Oak, may sometimes be found upon the same tree.

In autumn the small acorns with the cup covering one-half of the nut, and the scales forming a loose fringe about the margin of the cup, are distinctive. The large, angular buds, covered over their whole surface with pale hairs, are an unfailing distinguishing characteristic in winter.

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1 = Flowering branch with immature leaves, (s) staminate blossoms, (p) pistillate blossoms; 2 = a mature leaf; 3 = branch with leaves and mature fruit; 4 = an acorn cup; 5 = an acorn; 8 = section of winter twig showing the large, angular and pubescent bud and leaf-scars with bundle-scars, enlarged

Photo by U. S. Forest Service

LAUREL OAK

Laurel Oak

Quercus imbricaria *Michaux*

Family.—Beech.

Other Names.—Laurel Oak; Jack Oak; Water Oak.

General Description.—*Shape:* when young pyramidal; when old broad, open- and shallow-crowned. *Height:* 50 to 60, sometimes 100 feet. *Bark:* grayish-brown, shallow fissured, up to 1½ inch thick. *Buds:* alternate, sharp-pointed, 1/8 of an inch long, covered with numerous chestnut-brown scales. *Leaves:* alternate, thin, dark and shiny above, pale green and hairy below, 4 to 6 inches long, 1 to 2 inches wide, entire on margin. *Flowers:* appear about May; pollen-bearing, occur in hairy tassels 2 to 3 inches long; fruit-producing occur solitary on short stalks on new growth. *Fruit:* a dark-brown, stalked acorn ½ to 1/3 of an inch long; cup incloses almost half of nut.

Preferred Habitat.—Rich bottom-lands and moist, fertile uplands.

Range.—Pennsylvania to Michigan and Nebraska, south to Georgia and Arkansas.

The Laurel Oak is a typical representative of a small group of Oaks which have narrow entire-margined leaves. One who is accustomed only to the form of oak leaves as found in the White, Rock, Red, Scarlet, Pin, and other similar Oaks almost needs to see the acorns on this tree in order to believe that it is really an Oak.

The name "Laurel Oak" was given to this tree because its leaves resemble those of the common Mountain Laurel in form, size, texture, and color. It is also called "Shingle Oak," because in the early days shingles were made locally from it.

The Laurel Oak attains its maximum size in the Mississippi Valley, where it sometimes reaches a height of 100 feet and a diameter of 3 feet. It is distinguished easily by its leaves, which are 4 to 6 inches long, 1 to 2 inches wide, dark and shiny on the upper surface, pale green and hairy on the lower surface, and entire along their margins.

There is another oak—Willow Oak—that has leaves which are somewhat similar to it. The Willow Oak, however, is smaller, has narrower leaves which are also sharper-pointed and not hairy on the lower surface. The acorns of the Laurel Oak are larger and the cups not so flat as those of the Willow Oak. The winter buds of the Laurel Oak are light chestnut brown and somewhat angular, while those of the Willow Oak are dark chestnut brown.

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1 = Flowering branch with immature leaves, (s) staminate blossoms, (p) pistillate blossoms, (i) immature acorns; 2 = branch with mature leaves, immature and mature acorns; 3 = an acorn cup; 4 = an acorn; 5 = winter twig with buds, lenticels, pentangular pith and immature acorns; 6 = section of winter twig, enlarged

LIVE OAK

Photo by U. S. Forest Service

Live Oak

Quercus virginiana *Mill*

Family.—Beech.

General Description.—*Shape:* Trunk usually swollen near base and divided a few feet above ground; crown very wide, often 150 feet in width and only 50 feet high. *Height:* usually 40 to 50 feet, with a diameter of 3 to 7 feet. *Age:* 250 to 300 years. *Bark:* on main trunk thick, furrowed, scaly, dark reddish-brown; on twigs and branchlets hairy, light brown to grayish. *Buds:* alternate, 1/6 of an inch long, blunt-pointed, light brown. *Leaves;* alternate, simple, evergreen, thick, leathery, entire-margined or occasionally toothed to spiny at tip, dark green above, white and hairy below. *Flowers:* similar to those of the other Oaks. *Fruit:* an acorn maturing in one year and ripening in September and October; acorn cup incloses 1/3 of nut, which contains a sweet kernel.

Preferred Habitat.—Low, sandy soil, and usually occurs near the coast.

Range.—Found along coast from Virginia to Florida, and west to Mexico. Also native to western Cuba.

The Live Oak, so called because the leaves persist throughout the winter, can readily be recognized at all seasons of the year by its evergreen, leathery and entire-margined leaves, which are green and glossy on the upper surface and whitish and hairy on the lower surface. Its long-stalked acorns, extremely wide-spreading crown, and divided trunk are also helpful distinguishing characteristics. Its branches are frequently laden heavily with drooping clusters of moss, which give a very distinctive appearance to the tree, and account for it being called the grandest and most beautiful tree of the coastal plains region of the Southern States.

Before iron began to play such an important role, the Live Oak was highly prized for ship-building. In the early days of navigation, the Congress of the United States enacted laws for the perpetuation of the supply of this desirable wood, which weighs thirteen pounds per cubic foot more than White Oak, but is so hard, tough, and difficult to work that it is now rarely used.

THE NETTLE FAMILY

URTICACEÆ

THIS family contains a large number of trees, shrubs, and other smaller plants. The trees and shrubs alone comprise more than 1,000 species which occur in temperate and tropical regions of both hemispheres.

The principal groups of trees belonging to this family are:

1. The Elms.
2. The Hackberries.
3. The Mulberries.
4. The Osage Orange.

These four groups have some characteristics in common, but their fruits have little, if any, similarity. No other family of our common trees has so variable and extreme types of fruit. That of the Elm consists of a small dry seed completely surrounded by a thin membrane-like wing; that of the Hackberries is a small edible drupe; that of the Mulberries is a fleshy and edible aggregation of drupes; while that of the Osage Orange is a fleshy, milky, non-edible aggregation of drupes about the size of a large orange. The fruit of the latter is unique among that of our common trees.

THE ELMS

Ulmus

Fifteen species of Elm are known in the world, of which number six are native to North America. The principal species which one may meet in the eastern United States are:

1. American Elm, the favorite tree of the American people.

2. Slippery Elm, so-called because of the mucilaginous inner bark.

3. Cork, or Rock, Elm, which derives its name from the corky-winged projections on the twigs and the extremely hard wood.

4. English Elm, a large and handsome tree introduced from Europe, and a distinctive feature of Boston Common.

The Elms are valuable lumber and shade trees. Some of them produce a tough inner bark which is used for food, in medicine, and manufactured into ropes and coarse cloth. More than ninety-five per cent. of the wooden hoops used on barrels are made of Elm. The wood is also used extensively for barrel staves and headings, agricultural implements, and for a great variety of manufacturing purposes. They deserve to be protected carefully against fire, insects, fungi, and other destructive agencies, and propagated extensively for their valuable wood, excellent shade, and attractive appearance.

American Elm

ULMUS AMERICANA *Linnæus*

FAMILY.—Nettle.

OTHER NAMES.—White Elm; Gray Elm; Water Elm; Swamp Elm.

GENERAL DESCRIPTION.—*Shape:* large, spreading, with graceful, drooping branches; many different ornamental forms are recognized. *Height:* 80 to 100 feet, sometimes 120 feet. *Bark:* grayish, rough, furrowed, usually firm but occasionally flaky. *Buds:* alternate, ovate, about ¼ inch long, covered with 6 to 10 overlapping reddish-brown scales. *Leaves:* alternate, simple, ovate, 4 to 6 inches long, somewhat rough, and oblique base. *Leaf-scars:* semi-circular in outline, corky on surface, and marked with three bundle-scars. *Flowers:* appear in March and April before the leaves. Occur in three- to four-flowered clusters on drooping stalks. *Fruit:* matures early in spring shortly after flowers, consists of a flat seed surrounded by a membrane-like wing.

PREFERRED HABITAT.—Rich, moist bottom-land. Common along streams, borders of lakes and ponds, and in rich soil. Usually mixed with other hardwood trees.

RANGE.—Newfoundland, across Canada to the Rocky Mountains, and south to Florida and Texas.

THE American Elm is generally regarded as the favorite tree of the American people. Michaux, the famous French botanist, called it "the most magnificent vegetable of the temperate zone." It is hardy, grows rapidly, and yields a moderately valuable wood, and has a very wide distribution.

AMERICAN ELM

1 = Flowering branch with leaf-buds; 2 = a flower, enlarged; 3 = branch with mature fruit, immature leaves, and an expanding bud; 4 = branch with mature leaves; 5 = winter twig with (f) flower-buds, and (l) leaf-buds; 6 = a leaf-scar with bundle-scars, enlarged; 7 = section of a winter twig with a slightly pubescent bud, enlarged

This attractive and graceful tree may be recognized at all seasons of the year by its distinctive but rather variable form. In winter, the slender, drooping, reddish-brown twigs bearing small and alternate reddish-brown buds and semi-circular leaf-scars containing three bundle-scars, are helpful distinguishing characteristics. In spring, long before the leaves emerge, the flowers make their appearance in small drooping clusters. The fruit, which appears shortly after the flowers, is also very distinctive. It consists of a small seed, surrounded on all sides by a membrane-like wing.

The leaves are ovate, sharp-pointed at the apex, distinctly saw-tooth-like on the margin, oblique and heart-shaped at the base, and arranged alternately on the slender twigs. The primary and secondary veins are straight, and sunken on the upper surface and projecting on the lower surface.

The American Elm surely holds a prominent place in American history, and its importance is not waning, for it has been planted extensively as a Tribute Tree and Memorial Tree in honor of those who made "the supreme sacrifice" during the World War.

Slippery Elm

Ulmus fulva *Michaux*

Family.—Nettle.

Other Names.—Red Elm; Moose Elm

General Description.—*Shape:* medium-sized with broad flat crown. *Height:* 40 to 60, sometimes 80 feet. *Bark:* on old trunks thick, dark brown, shallowly fissured; inner bark mucilaginous. *Buds:* alternate, chestnut-brown, ¼ of an inch long, covered with about 12 bud-scales coated with rusty-brown hairs. *Leaves:* alternate, simple, ovate, 5 to 7 inches long, oblique at base, rough in both directions. *Flowers:* appear in short-stalked clusters early in spring before the leaves. *Fruit:* a short-stalked, winged, flat seed, ½ to ¾ of an inch broad.

Preferred Habitat.—Low, rich soil along streams and on hillsides. Common on limestone soil.

Range.—Valley of Saint Lawrence, south to Florida, west to North Dakota and Texas.

The Slippery Elm can be distinguished from all other Elms by its fragrant and mucilaginous inner bark. Some Indians called it "oo-hoosh-ab," meaning "it slips."

In winter its dark chestnut-brown buds covered with rusty-brown hairs are a sure means of identification. It is a smaller tree than either the American or Rock Elm, rarely exceeding 50 feet in height and 2 feet in diameter. Its leaves are rough in both directions, while those of the other native Elms are rough in one direction only.

The general appearance of the Slippery Elm enables one to distinguish

SLIPPERY ELM

1 = A flowering branch; 2 = a flower, enlarged; 3 = branch with mature leaves; 4 = branch with mature fruit and expanding leaf-buds; 5 = winter twig with (f) flower-buds, and (l) leaf-buds; 6 = section of a winter twig with a densely pubescent bud, enlarged; 7 = a leaf-scar with bundle-scars, enlarged

it readily from the American Elm, for its lateral branches are rather straight and ascending while those of the American Elm are drooping. In many parts of its range it thrives wherever an outcrop of limestone soil occurs. It likes limestone soil, while such trees as Chestnut and Pitch Pine are not found in soils charged heavily with lime.

The Slippery Elm is a widely distributed forest tree, being native from the valley of the St. Lawrence to North Dakota and south to Florida and Texas. Its wide natural range, coupled with the fact that it grows rapidly, produces durable wood of a fair quality, and has few insect enemies, suggests a promising future for this tree.

Rock Elm

Ulmus racemosa *Thomas*

Family.—Nettle.

Other Names.—Cork Elm; Hickory Elm; Hard Elm.

General Description.—*Shape:* heavy-trunked with narrow, oblong crown. *Height:* sometimes reaches 100 feet with a diameter of 5 feet. *Bark:* on the main trunk thick and grayish with wide furrows separating scaly ridges; on the branches reddish-brown, lustrous with corky wing-like projections. *Buds:* egg-shaped, sharp-pointed; brown, about ¼ of an inch long. *Leaves:* alternate, simple, 3 to 6 inches long, about 2 inches wide; coarsely-toothed on margin, unequal-based, dark green above, pale and hairy beneath. *Flowers:* appear March to April before the leaves; borne on slender drooping stalks in loose clusters. *Fruit:* a one-seeded samara about ½ of an inch across; seed surrounded completely by a membranous wing and covered completely with hairs; ripens about May.

Preferred Habitat.—Dry, gravelly uplands, rocky ridges and slopes. Occurs also on heavy clay soils and river banks.

Range.—Quebec, Vermont, and northern New York to southern Michigan and Wisconsin, south to Nebraska, Missouri, and middle Tennessee.

The striking feature which distinguishes the Rock Elm from all other Elms in northeastern United States is the corky-winged projections found upon the twigs and smaller branches. These corky-winged projections give the tree an entirely different appearance than that of any other associated tree, and account for its common name, Cork Elm, which was used almost exclusively until lumbermen began calling it Rock Elm.

When at its best, the Rock Elm compares favorably in size and dignity to the American Elm, but lacks some of the grace of the latter species. It may reach a height of 100 feet and a diameter of 3 feet, and produces heavy, hard, and close-grained wood which is used for a great variety of purposes. On account of the excellent wood produced by this tree it is sometimes called Hickory Elm. Occasionally it is found growing on rocky ledges, which accounts for its other common name, Cliff Elm.

For a long while this tree was planted extensively for shade and ornamental purposes. It grows rapidly and has other merits, but it also has a

Courtesy of "Indiana Trees"

ROCK ELM

bad habit in that it sends its roots out great distances near the surface of the ground in search of water, and from them spring up numerous "sucker sprouts" which are difficult to destroy and have ruined many a garden and lawn.

THE HACKBERRIES

CELTIS

There are sixty different species of Hackberries in the world, of which nine are native to North America. Representatives are found in the temperate and tropical regions both of the eastern and western hemispheres. They are especially famed for their sweet berries, which are a source of food to man, and the wild animals of the field and forest.

A number of the native species attain a large tree size, and one of them, known as the Sugarberry (*Celtis mississippiensis*), is a favorite host of the Common Mistletoe, used so extensively for Christmas decorative purposes. The Misletoe is a parasitic plant, sometimes called Tree-thief, and draws all its nourishment from the tree upon which it lives. In the Southwest it is not unusual to find the branches of a Hackberry tree literally dotted with dense clusters of this parasitic woody flowering plant.

HACKBERRY

CELTIS OCCIDENTALIS *Linnæus*

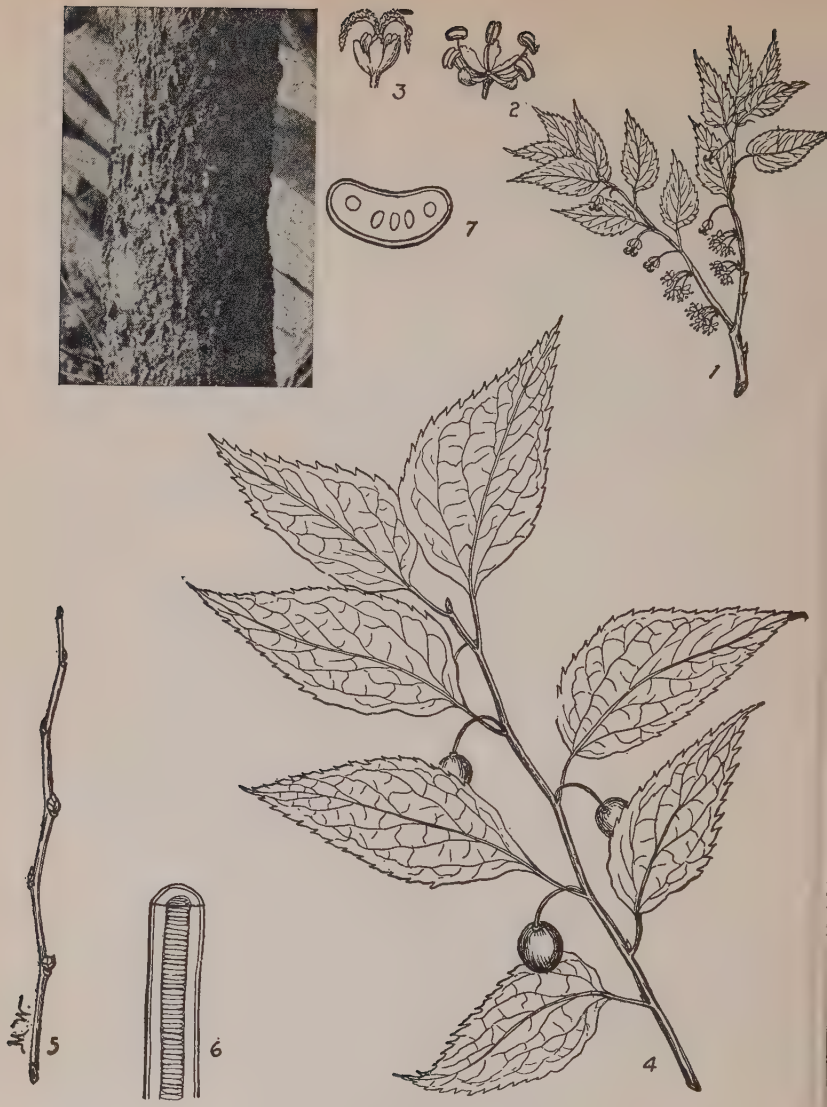
FAMILY.—Nettle.

OTHER NAMES.—Sugarberry; Nettle-tree; Hoop Ash; Hack-tree; Bastard Elm.

GENERAL DESCRIPTION.—*Shape:* wide-spreading and round-topped. *Height:* 40 to 50, sometimes 80 feet. *Bark:* grayish-brown, usually roughened by hard, warty projections. *Buds:* alternate, small, ovate, flattened, covered with 3 to 4 scales; often swollen and malformed, due to insect-galls. *Leaves:* alternate, simple, ovate, 2 to 4 inches long, sharp-pointed, and rough on upper surface. *Leaf-scars:* small, semi-oval, with 1 to 3 bundle-scars. *Flowers:* appear about May, are greenish, and occur in clusters on drooping stalks. *Fruit:* a small dark purple, round, sweet berry, which matures about September.

PREFERRED HABITAT.—Rich and rather moist soil, but may occur on gravelly soil; usually mixed with other hardwood trees.

RANGE.—Greater part of the United States east of the Rocky Mountains.



HACKBERRY

1 = Branch with immature leaves, staminate and pistillate flowers; 2 = a staminate flower, enlarged; 3 = a pistillate flower, enlarged; 4 = a branch with mature leaves and mature fruit; 5 = a winter twig; 6 = section of a winter twig showing chambered pith, enlarged; 7 = a leaf-scar with bundle-scars, enlarged

The Hackberry has one characteristic common to only a few trees native to the United States, viz., its *pith is chambered*. If one takes a twig and cuts it lengthwise through the center the pith will be shown as a series of white partitions separating empty chambers. The Black Walnut and Butternut are other common American trees which possess this unusual characteristic.

The leaves resemble those of the Elms, but are smaller, more slender, and sharper-pointed. Its fruit is a solitary, one-seeded, purplish, sweet drupe, which often persists far into winter and furnishes delicious food to wild birds. Witches-brooms and abnormally swollen buds are very common upon this tree. They are caused by the sting of small gall-insects. It is often possible to recognize this tree at a great distance by the clusters of twigs which may be scattered throughout the crown in large numbers. The rough, hard, and wart-like projections upon the bark of the young trunks is also a reliable means of identification.

The wood is similar to that of the Elms in structure, but resembles the Ashes in appearance. It is usually sold on the market as Ash, and is used in the manufacture of crates, boxes, cooperage, handles, and agricultural implements.

The food which the Hackberry tree supplies to birds during the winter months, when other food is scarce, will more than justify all efforts put forth in its protection and propagation.

THE MULBERRIES

Morus

There are ten different species of Mulberries found in the world, but only three of them are native to North America. Representatives of this group of trees and shrubs are native to eastern North America, Central America, South America, Europe, and Asia. They are most abundant in Asia, which is the home of the common White Mulberry (*Morus alba*, L.), planted so extensively in eastern North America, where it has escaped cultivation in many places.

The wood is exceedingly durable, and is largely used by boat-builders, coopers, and implement makers.

RED MULBERRY

1 = Branch with immature leaves and four staminate flower spikes; 2 = branch with immature leaves and three pistillate flower spikes; 3 = branch with mature leaves and mature fruit; 4 = a winter twig; 5 = section of a winter twig, enlarged; 6 = a leaf-scar with bundle-scars, enlarged

Red Mulberry

Morus rubra *Linnæus*

Family.—Nettle.

Other Names.—Mulberry; Black Mulberry.

General Description.—*Shape:* broad and round; trunk usually divides near ground. *Height:* 35 to 50, sometimes 70 feet. *Bark:* rather thin, grayish-brown, flaky. *Buds:* alternate, ovate, about 2/5 of an inch long, covered by 3 to 9 greenish to reddish-brown scales. *Leaves:* alternate, simple, ovate, 3 to 5 inches long, heart-shaped, and often oblique at base; veins very prominent, and exude a milky secretion. *Leaf-scars:* raised on enlargement of twigs, hollow, almost circular. *Flowers:* appear in May and June, and occur in dense spikes. *Fruit:* an aggregation of small drupes about 1 inch long; at first green, then red, and finally dark purple, juicy and edible.

Preferred Habitat.—Rich, moist soil; usually occurs with other hardwood trees in valleys and on foot-hills.

Range.—Massachusetts to Florida, and west to Kansas and Nebraska.

The Red Mulberry is the only species of Mulberry native to the eastern United States. In summer, the large, roundish, sharp-tipped leaves, with deeply sunken veins on the upper surface, are distinctive. Some of the leaves are lobed and resemble an ordinary mitten in outline. The most positive distinguishing characteristic of the leaves is a milky secretion which flows from the cut section of the leaf-stalk. The seed-bearing flowers develop into a purplish, aggregate fruit, which is the most distinctive product of the tree.

In winter the Red Mulberry is not particularly attractive, but it can readily be distinguished if its twigs are examined closely. They are very smooth, clean, and light greenish-brown. They bear oval and hollow leaf-scars, which contain a large number of bundle-scars arranged in a closed ellipse.

The Red Mulberry cannot be classified as an important timber tree, but it has many useful qualities. The fruit is valued for fattening hogs and poultry. Many a weary harvester has found shelter under its crown, and been refreshed by its fruit.

OSAGE ORANGE

Osage Orange

Maclura pomifera *Schneider*

Family.—Nettle.

Other Names.—Hedge-tree; Yellow-wood; Osage Apple Tree; Bow-wood; Bois d'Arc.

General Description.—*Shape:* round-topped, rather open and irregular. *Height:* 30 to 40, sometimes 60 feet. *Bark:* pale to yellowish-brown and dark gray, evidently fissured, bearing scattered stout spines. *Buds:* alternate, broad, globular, covered with 5 to 7 chestnut-brown scales. *Leaves:* alternate, simple, ovate, about 4 inches long, smooth dark green, entire on margin, acute at apex, and wedge-shaped at base. *Leaf-scars:* small, broadly triangular to elliptical, containing 1 to 3 bundle-scars, and located on twig enlargements. *Flowers:* appear about June, occur in dense stalked heads. *Fruit:* an aggregation of drupes, orange-like in appearance, 4 to 5 inches in diameter.

Preferred Habitat.—Very modest in its soil demands, but makes best growth on fertile flats.

Range.—Oklahoma, south to Dallas, Texas. Planted in almost every State east of the Rocky Mountains.

The historians tell us that the Osage Orange, which is the only tree of its kind in the world, was used by the Indians for clubs and bows long before the white man discovered America. It is not prized because of the valuable wood which it produces, or the great size it attains, but the tree is really interesting from root to fruit. The bark of the roots is of a deep orange color, and yields a valuable dye. The wood is also rich yellow in color, sometimes streaked with red. It is one of the hardest, strongest, and most durable woods native to North America, and is locally used for fence posts, wagon-felloes, and insulator pins. Police clubs and tobacco pipes are made from it. The bark on the trunk is furrowed and scaly, and contains some tannin.

Its fruit is one of the most unique known to science. In size and form it resembles a large orange. At first it is green in color, but when mature it becomes yellowish, and if bruised it exudes a milky secretion which turns black very rapidly.

Another distinctive feature of the tree is its thorns. They are straight, stiff, sharp-pointed, originate in the axils of the leaves, and possess an unusual lacerating power.

The Osage Orange is free from insect enemies and fungal foes. In fact, it is so vigorous that it is difficult to eradicate it, where it is thoroughly established.

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1 = Branch with immature leaves and heads of staminate flowers; 2 = a staminate flower, enlarged; 3 = branch with a head of pistillate flowers; 4 = a pistillate flower, enlarged; 5 = branch with mature leaves and a single mature fruit; 6 = a winter twig with three thorns; 7 = section of a winter twig showing lenticels, buds, and leaf-scars with bundle-scars, enlarged

PAPAW

CUSTARD APPLE FAMILY

ASIMINA

PAPAW

ASIMINA TRILOBA *Dunal*

FAMILY.—Custard Apple.

GENERAL DESCRIPTION.—*Shape:* short trunk bearing low, broad crown. *Height:* 10 to 40 feet. *Bark:* thin, dark brown, slightly furrowed, often white blotched. *Buds:* alternate, brown, naked, hairy; terminal buds long and flat; flower buds round, dark-brown, about one-sixth of an inch in diameter. *Leaves:* alternate, simple, 4 to 12 inches long, pointed at apex, tapering at base, entire on margin. *Flowers:* appear April to May; occur solitary, at first green, later reddish-purple, 1 to 1½ inch wide. *Fruit:* suggest a stubby banana, is pulpy, edible, at first green, later yellowish brown, 3 to 5 inches long, contains many dark-brown seeds.

PREFERRED HABITAT.—Rich, moist situations. Common along streams and low fertile slopes.

RANGE.—Western New York and New Jersey to Florida, and west to Michigan, Kansas, and Texas.

A FOREST tree must do one of two things to maintain itself. It must grow up high and enjoy the sunlight, or it must learn to endure shade. The Papaw has elected to do the latter, for one usually finds it growing under the cover of larger trees, or in groups in meadows and abandoned fields, and along the border of woodlands.

The best time to identify the Papaw is in fall, when its unique fruit, which resembles a stubby banana, is at hand. The fruit is 3 to 5 inches long, has an edible pulp containing many brown seeds, and is covered with a firm skin which is at first green but becomes yellowish-brown when ripe. The blossoms are as interesting as the fruit. They occur solitary, measure about 1½ inch across, are greenish-purple at first, but upon maturing become reddish-purple.

In summer the Papaw may be identified easily by its large, tropical-like and alternately arranged leaves. In winter the long, slender, somewhat flattened, naked brown buds are a positive means of identification. The flower buds, about the size and shape of a small pea, and the U-shaped leaf-scars enable one to distinguish it from all its associates.

The Papaw is the most northern member of the genus *Asimina*, which is the only genus of the Custard Apple Family found outside the tropics.

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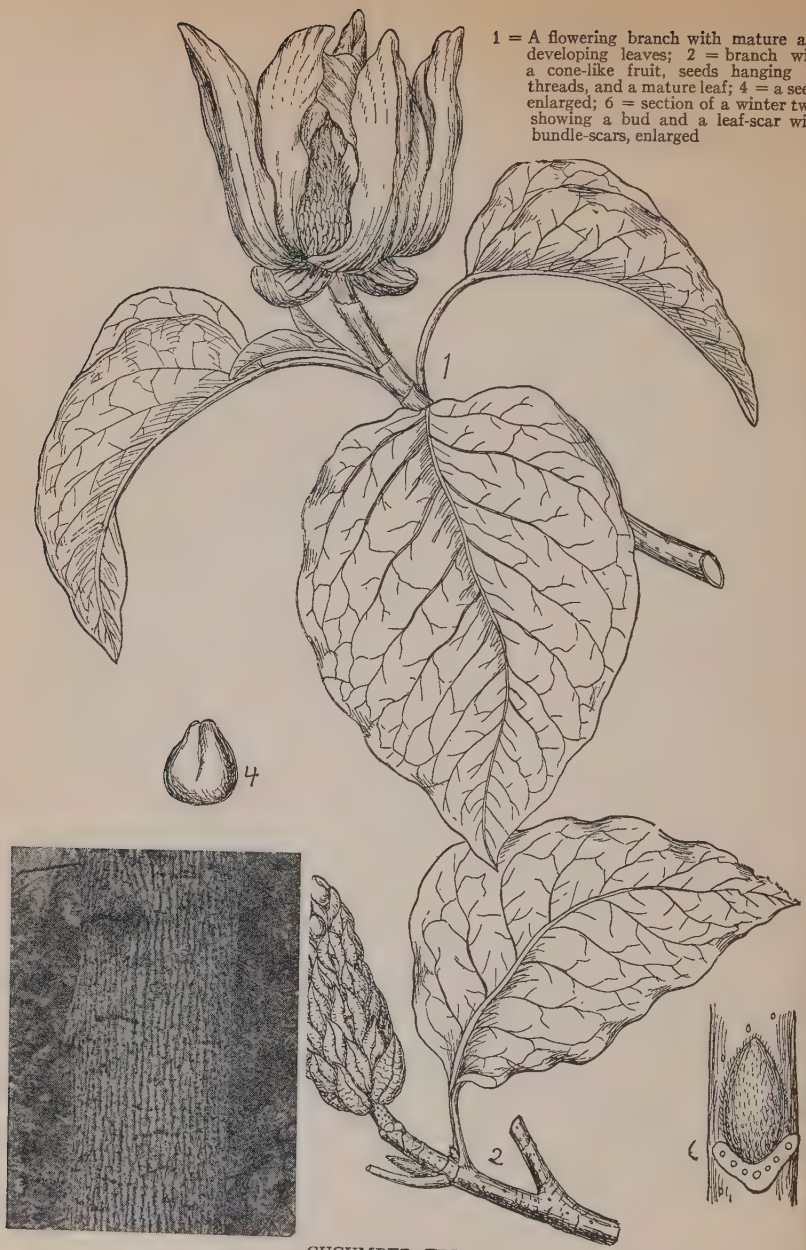
1 = A mature leaf; 2 = a flowering branch with immature leaves; 3 = a fruiting branch; 5 = a seed, natural size; 7 = section of a winter twig, enlarged



1 = A flowering branch with mature and developing leaves; 2 = branch with a cone-like fruit, seeds hanging by threads, and a mature leaf; 4 = a seed, enlarged; 6 = section of a winter twig showing a bud and a leaf-scar with bundle-scars, enlarged

CUCUMBER TREE

820

THE MAGNOLIA FAMILY

MAGNOLIACEÆ

THE Magnolia Family comprises ten different groups of trees and shrubs, which are widely distributed in temperate and tropical regions. There are, however, only two different groups of these trees in the native flora of North America, viz.:

1. The Magnolias.
2. The Tulip Tree.

The Magnolias are among the most beautiful trees native to the eastern part of North America. All of them produce beautiful large flowers, and bear large, deep-green, tropical-like leaves. They derived their name from Pierre Magnol, a famous French botanist, who was a professor of botany in Montpelier, and died in 1715. Representatives of these attractive trees are native to eastern North America, southern Mexico, the West Indies, and Asia. Some of the most attractive and extensively used ornamental varieties of Magnolia have been developed from species native to eastern Asia. They are now being used everywhere for out-of-door planting and interior decoration, and possess the largest flowers of any tree in cultivation.

Cucumber Tree

Magnolia acuminata *Linnæus*

Family.—Magnolia.

Other Names.—Mountain Magnolia; Cucumber; Magnolia.

General Description.—*Shape:* pyramid-like in open situations; in dense stands crown is broad and shallow. *Height:* 60 to 70, sometimes 120 feet, with a diameter of 4 feet. *Bark:* grayish-brown, deeply furrowed, loose, and somewhat scaly. *Buds:* alternate, long, slender, hairy, sharp-pointed, about 3/5 of an inch long. *Leaves:* alternate,

TULIP TREE

1 = A flowering branch with mature and developing leaves; 2 = branch with a cone-like fruit; 3 = a single carpel, natural size; 4 = portion of a carpel showing seeds, natural size; 5 = a seed, enlarged; 6 = side view of a seed, enlarged; 7 = a winter twig; 8 = a terminal bud, just opening; 9 = a twig showing developing leaves

simple, ovate, sharp-pointed, thin, 6 to 12 inches long, and 3 to 5 inches wide. *Leaf-scars:* crescent to broadly V-shaped with 6 to 8 bundle-scars. *Flowers:* appear from April to June, slender bell-shaped, greenish, tinged with creamy yellow, about 3 inches long. *Fruit:* matures about October, somewhat resembles a cucumber, about 2½ inches long, contains numerous seeds which are scarlet red when mature.

PREFERRED HABITAT.—Rich woods close to streams and on dry slopes.

RANGE.—Western New York and southern Ontario, south to Georgia and Arkansas.

THE Cucumber Tree obtained its common name from its unique fruit, which when green somewhat resembles an ordinary cucumber.

When grown in a dense stand it rises straight up for thirty to fifty feet without a branch. On the other hand, if developed in an open situation the lateral branches start low along the trunk, and the resulting crown is high and pyramid-like.

In summer the large tropical-like leaves, and the large greenish-yellow flowers are a sure means of identification. After the petals have fallen the curious fruit begins to develop. It resembles a cucumber. About September it turns pink, and the covering shows many small cracks from which little red berries break forth.

The smooth and bitter twigs bearing long, slender and somewhat hairy buds and crescent-shaped leaf-scars are very helpful means of identifying the tree in winter. The grayish-brown and long-furrowed bark on the trunks of trees is at hand at all seasons of the year, and will enable anyone to recognize this fine forest tree.

The Cucumber Tree is the most important forest tree of all the Magnolias. The wood is similar to that of the Tulip Tree, and usually sold upon the market as Yellow Poplar. It grows rapidly, attains a large size, is easily propagated, and has few insect and fungous enemies. It is a magnificent tree for lawn and park planting.

TULIP TREE

LIRIODENDRON TULIPIFERA *Linnæus*

FAMILY.—Magnolia.

OTHER NAMES.—Yellow Poplar; Tulip Poplar; Whitewood; Poplar; Popple.

GENERAL DESCRIPTION.—*Shape:* pyramid-like to broad and spreading. *Height:* 60 to 150 feet. *Bark:* on young trees smooth, bitter, ashy-gray, and mottled with light spots; on old trees thick, rough, and furrowed. *Buds:* alternate, large, smooth, flattened, blunt-pointed and covered with one pair of leaf-like scales. *Leaves:* alternate, simple, broad, 4 to 6 lobed, apparently cut off at apex. *Flowers:* mature in May and June; large, tulip-like, greenish-yellow, with 3 sepals and 6 petals. *Fruit:* matures in September and October, cone-like, light-brown, about 3 inches long, and often persists throughout the winter.

PREFERRED HABITAT.—Deep, rich, moist mountain soil.

RANGE.—Rhode Island to Michigan, and Missouri and south to Florida and Arkansas.

THE Tulip Tree is one of the most stately and magnificent trees of the

forests of eastern North America. It grows to a great size, and frequently reaches a height of 80 to 120 feet, and attains a diameter of six to eight feet. One specimen was found in western North Carolina which was sixteen feet thick. Many of these large trees are 300 to 350 years old.

The Tulip Tree can readily be recognized by its straight and clean trunk, with a very deep-furrowed bark and its characteristic broad, slightly lobed, and blunt-pointed mass of leaves. The leaves appear to have their apexes cut off at right angles to the midrib. The leaf appendages which occur at the base of the leaves encircle the twigs, and upon falling off leave distinctive linear scars which encircle the twigs.

This tree probably has the most interesting and unique buds of any American forest tree. They comprise a series of leaf-like scales, each of which incloses a miniature leaf. In spring and early summer the tulip-like flowers, and in fall and winter the erect cone-like fruit, are also distinctive.

The Tulip Tree yields a wood which ranks with the world-famous White Pine. It is soft, whitish to yellowish, handsome in color, polishes nicely, and does not warp or shrink badly. It is odorless, tasteless, and used extensively for candy and cigar boxes, tobacco hogsheads, and kitchen and pantry utensils.

THE LAUREL FAMILY

LAURACEÆ

THE Laurel Family comprises about forty different groups of plants which embrace about 1,000 different species. Most of the members of this family are found in the tropics. Only two representatives are found north of the Mason and Dixon line, viz.: the Sassafras and Spice Bush [*Benzoin æstivale* (L.) Ness.].

At one time, the medicinal properties of the Sassafras Bush were held in high regard; but its virtues are now considered to belong more truly to the commercial arts. It is used extensively as a flavoring for candy, and in the preparation of a

"tea," much esteemed by many persons. The wood, bark, and roots yield the essential oil which is the basis of the "flavor."

Sassafras

Sassafras varifolium *Kuntze*

Family.—Laurel.

Other Names.—Sassafras; Saxifrax Tree; Saxifrac.

General Description.—*Shape:* crown flat-topped or round, and dense; trunk stout and short. *Height:* 40 to 50. sometimes 100 feet, with a diameter of 3 to 4 feet. *Bark:* on old trunks reddish-brown, deeply fissured, and flat-ridged; on twigs green, smooth, aromatic, and mucilaginous. *Buds:* alternate, ovate, 2/5 of an inch long, covered with 2 or 3 green, slightly heavy scales. *Leaves:* alternate simple, ovate, 4 to 6 inches long, entire or 2 to 5 lobed. *Leaf-scars:* small, raised, with a single bundle-scar. *Flowers:* appear about May, greenish-yellow, and arranged in loose drooping cluster. *Fruit:* a dark-blue, glossy berry, borne on a bright red and stout stem.

Preferred Habitat.—Rich, sandy soil. Common along fence rows and in abandoned fields.

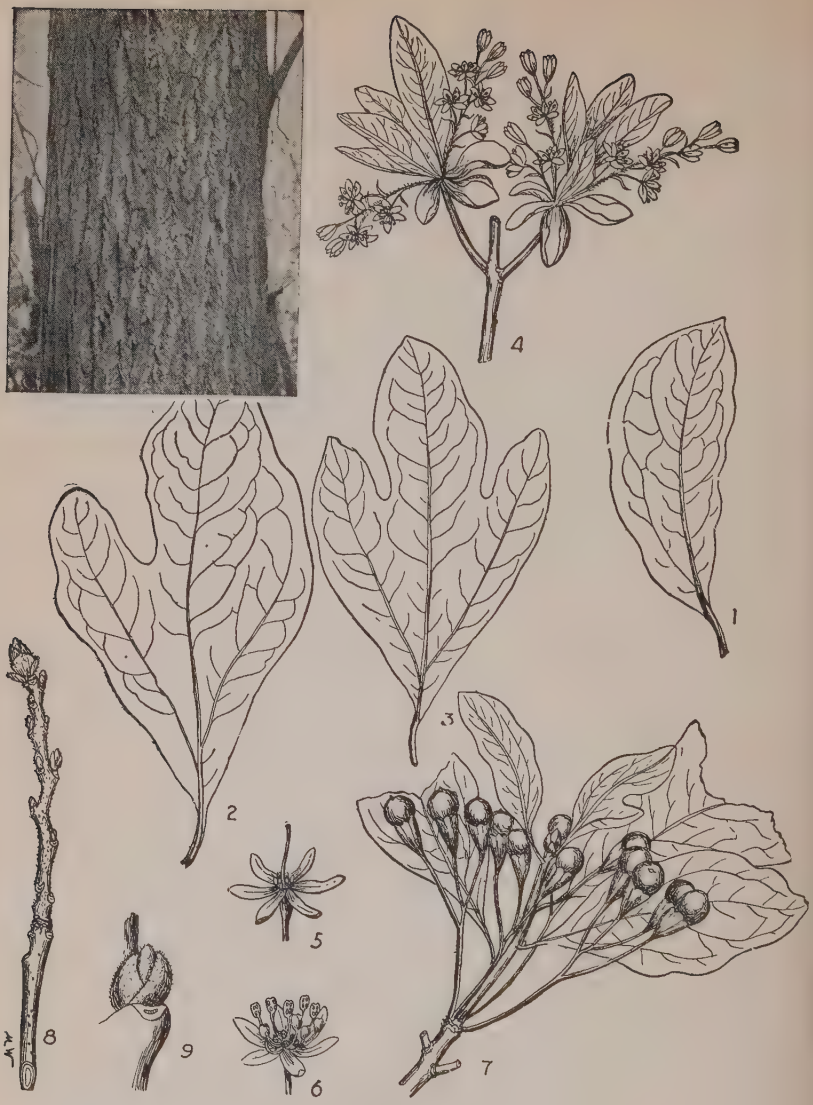
Range.—Massachusetts to Michigan and Kansas, and south to Florida and Texas.

The Sassafras, the sole representative of this genus in the United States, was one of the first American trees which became widely known in Europe. The Indians told the early settlers about its medicinal properties. Roots of Sassafras comprised a part of the first cargo ever exported from Massachusetts.

The distinctive aromatic taste of the bark, roots, and wood, and the accompanying pleasant odor, are positive means of identification. If one breaks off a brittle twig of green-barked Sassafras, a pleasant aromatic odor is emitted immediately; and upon chewing it, the flavor of the mucilaginous inner bark is found to be very delicious.

The leaves take on three distinctive forms, as if to help make the tree conspicuous, and have it stand out from all other trees. They are all simple in form and alternate in their arrangement. The oval entire-margined form is commonest. In the mitten form the leaf has one large thumb-like projection, which may be either on the right or left side. Sometimes the leaves are prominently three-lobed, and occasionally five-lobed.

The fruit is a dark-blue berry, which is borne on bright red and club-like fleshy stems, and arranged in rather open clusters. It furnishes excellent food for birds.



SASSAFRAS

1 = An ovate, entire leaf; 2 = a glove-form leaf; 3 = a three-lobed leaf; 4 = a flowering branch with immature leaves; 5 = a fertile flower, enlarged; 6 = a sterile flower, enlarged; 7 = a fruiting branch; 8 = a winter twig; 9 = section of a winter twig

Sassafras yields ordinary wood, which resembles Chestnut closely, and is often substituted for it on the market.

Fortunately, there need exist no fear of the tree becoming extinct, for birds carry the seeds to every fence corner, and scatter them over abandoned pasture-land in large numbers.

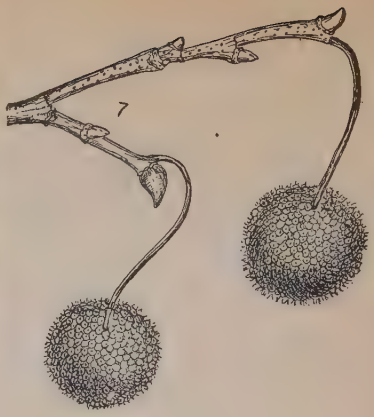
THE PLANE TREE FAMILY

PLATANACEÆ

THERE are only six representatives of the Plane Tree Family found in the world. Three of them are in the Old World, and three are native to the New World. They all attain tree size, and belong to a single genus, known scientifically as *Platanus*, which means broad, and refers to the width of the leaves.

Two representatives of this family are well known and distributed widely in the United States, viz.: the Oriental Plane Tree and our native Plane Tree, also known as Sycamore and Buttonwood.

The Oriental Plane Tree possesses all the characteristics desirable of a shade tree. It grows rapidly, is hardy, forms beautiful crown, gives ample shade, has an attractive bark, and is not troubled with insect pests. It has so many merits that it is being planted in some places almost to the exclusion of any other tree. In Washington and Philadelphia a large number have been set out; and in Paris a large percentage—probably more than one-third—of the city trees are Oriental Planes.



BUTTONWOOD

1 = A flowering branch; 2 = a head of flowers with most of the flowers removed; 5 = a fruiting branch with mature leaves; 6 = an achene, enlarged; 7 = a winter twig with two heads of fruit; 8 = section of a twig showing a subpetiolar bud

Buttonwood

Platanus occidentalis *Linnæus*

Family.—Plane Tree.

Other Names.—Buttonball; Sycamore; American Plane Tree.

General Description.—*Shape:* trunk short and stout; crown deep, wide-spreading, rather open, with interwoven branches. *Height:* 70 to 100, sometimes 170 feet, with a diameter of 4 to 10 feet. *Bark:* on twigs greenish to brown and hairy, marked with white dots; on young trunks peels off in irregular plates exposing a whitish, yellowish, or greenish inner bark; on old trunks thick, rigid, peels off in dark-brown scales. *Buds:* conical, very divergent from branches, covered with 3 reddish-brown scales, and completely surrounded with leaf-scars. *Leaves:* alternate, simple, broadly ovate, 4 to 10 inches across, toothed on margin, pale woolly on lower surface; base of leaf-stalk is enlarged and hollow. *Leaf-scars:* encircle the buds completely, unequal in width, have a wavy margin, contain 5 to 10 bundle-scars. *Flowers:* appear with the leaves in May in dense heads. *Fruit:* a brown ball 1 to 2 inches in diameter, and suspended from a slender stalk.

Preferred Habitat.—Moist, fertile soil, but will grow in dry situations.

Range.—Maine and Ontario, west to Minnesota, and south to Florida and Texas.

Our native Buttonwood, or Sycamore, is the most massive tree in the eastern United States. It may reach a height of over 150 feet, and occasionally exceeds ten feet in diameter. It has an exceptional crown, which is high, wide-spreading, and composed of many tortuous branches. The bark is so unusual, that it will never be forgotten if seen but once. It consists of a crazy patchwork of white, green, yellow, gray, and brown. In winter, white is the predominating color.

One of the delights of the country boy is to ask his friend to find the buds of the Buttonwood tree. At the first glance no buds appear to be at hand. A closer examination of a twig will reveal that the buds are hidden completely under the enlarged stalks of the leaves. Hence, the buds are described as *sub-petiolar*, which means under the petiole of the leaf.

The large leaves, head-like clusters of flowers, and the ball-like fruit which often persists far into winter, are very helpful distinguishing characteristics. In winter the smooth, reddish-brown pointed buds, surrounded completely with a leaf-scar, and covered with a single exposed bud-scale, will prevent one from confusing it with any other tree.

The wood of this tree is annually becoming of more commercial importance. It weighs about thirty-six pounds per cubic foot, and is used for crates, tobacco boxes, novelty wares, furniture, interior finishings, and other similar uses.

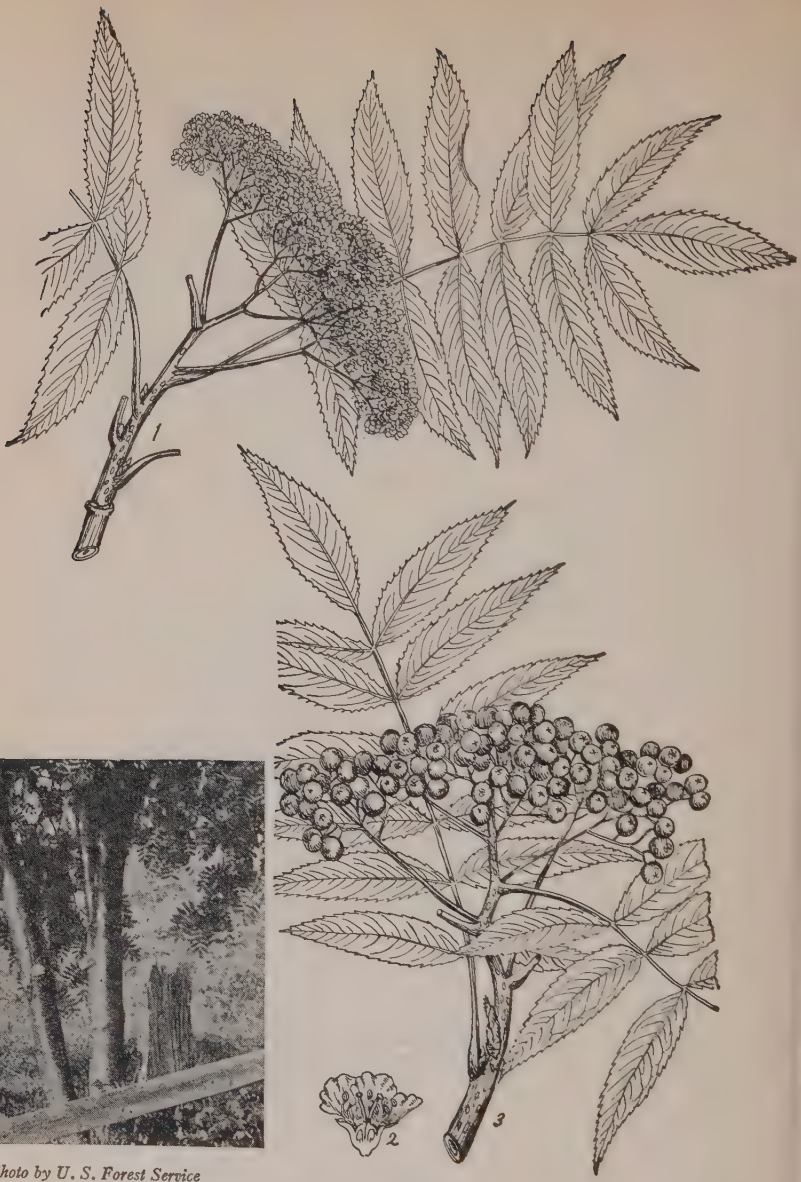


Photo by U. S. Forest Service

MOUNTAIN ASH

1 = A flowering branch with leaves; 2 = longitudinal section of a flower, enlarged; 3 = a fruiting branch

THE ROSE FAMILY

ROSACEÆ

THE Rose Family comprises more than one hundred different groups of plants, with a total membership of over 1,500 distinct species. Its representatives comprise trees, shrubs, and herbs. Among them are some of our common plants of the gardens and orchard trees. The Strawberries, Raspberries, Blackberries, and Dewberries are among its members. A few of the trees belonging to it are important on account of the timber which they produce, but most of them are prized for their fruit. The following groups of trees are among its well-known members:

Common Name	Scientific Name
1. The Plums, Cherries, and Peaches.	Prunus.
2. The Apples, Pears, and Mountain Ash.	Pyrus.
3. The Hawthorns.	Cratægus.
4. The Juneberries.	Amelanchier.

Mountain Ash

Pyrus americana *De Candolle*

Family.—Rose.

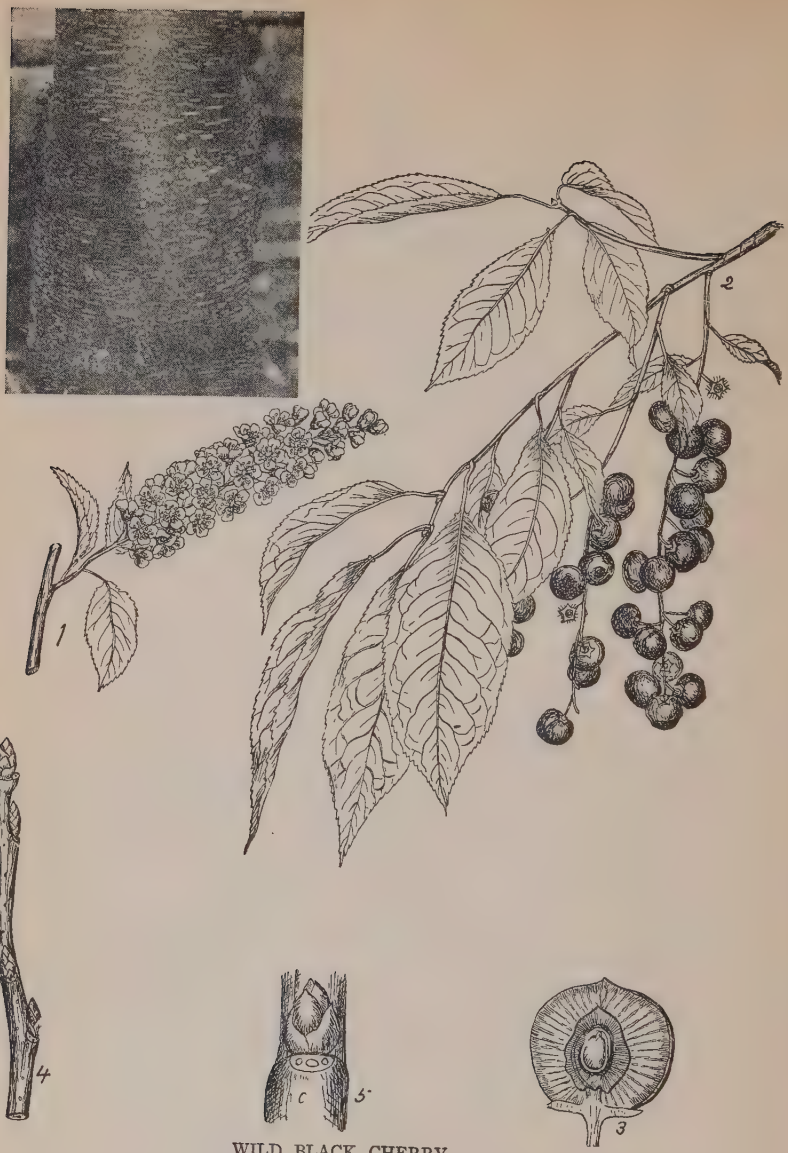
Other Name.—American Mountain Ash.

General Description.—*Shape:* medium-sized tree with narrow, round-topped crown. *Height:* 20 to 30, sometimes 50 feet. *Bark:* thin, grayish, smooth or scaly. *Buds:* purplish-red, slightly hairy, conical, sharp-pointed, sometimes ½ of an inch long. *Leaves:* alternate, compound, 6 to 10 inches long, with 13 to 17 sessile leaflets. *Leaf-scars:* rather large, U-shaped, contain 3 to 5 bundle-scars. *Flowers:* white, arranged in flat clusters measuring 3 to 4 inches across, and appear about May. *Fruit:* a bright red berry arranged in flat-topped clusters; matures about September.

Preferred Habitat.—Wet places and rocky hillsides.

Range.—Newfoundland to Manitoba and Iowa, southward along mountain to North Carolina.

The American Mountain Ash is a distinctly northern tree. It seems to thrive best in cold swamps and northern slopes. In 1918 I spent two days



WILD BLACK CHERRY

1 = Section of a flowering branch; 2 = a fruiting branch; 3 = section of a fruit, enlarged; 4 = a winter twig, natural size; 5 = section of a winter twig, enlarged

in exploring the Bears Meadows, located in Center County, Pennsylvania, which aggregate about 600 acres, and form an almost impenetrable swamp. The Mountain Ash was the commonest tree within the area, and was associated with the Black Spruce, Balsam Fir, Sundew, Pitcher Plant, and Sphagnum moss.

It frequently reaches a height of twenty-five feet, with a diameter of one foot, and may be distinguished by its alternate compound leaves with thirteen to seventeen stalkless leaflets, which are sharply toothed along the margin, and by its white flowers and bright red fruit arranged in flat-topped clusters about three to four inches wide. In winter the stout grayish to reddish-brown twigs marked with pale lenticels and bearing purplish-red, sharp-pointed, somewhat gummy, buds are helpful distinguishing characteristics.

The Mountain Ash produces no wood of commercial value. It is, however, being planted as an ornamental tree on account of its attractive white flowers and beautiful red fruit, but is set out less extensively than the European Mountain Ash, so common in our parks and gardens.

Wild Black Cherry

Prunus serotina *Ehrhart*

Family.—Rose.

Other Names.—Wild Cherry; Rum Cherry; Black Cherry; Cabinet Cherry.

General Description.—*Shape:* from narrow oblong to rounded. *Height:* 50 to 75, sometimes 110 feet. *Bark:* on twigs reddish-brown marked with numerous white lenticels; on young trunks smooth, glossy, reddish-brown, dotted with horizontally elongated lenticels (breathing pores); on old trunks black, rough, and scaly. *Buds:* smooth, glossy, about ¼ of an inch long, covered with reddish-brown scales, often coated with a white film. *Leaves:* alternate, simple, oblong, 2 to 5 inches long, sharp-pointed, finely-toothed on margin, glossy, deep green. *Flowers:* white, borne in narrow drooping clusters 3 to 4 inches long, and appear during May and June. *Fruit:* a purplish-black, juicy, bitter drupe, arranged in drooping clusters.

Preferred Habitat.—Rich, fertile bottom-lands and slopes.

Range.—Nova Scotia to South Dakota, south to Florida and Texas.

The Wild Black Cherry is the only native species of Cherry which attains the size of a large tree. The other common native species rarely exceed a height of forty feet and a diameter of ten inches. It may be distinguished at all seasons of the year by its bark. On old trunks it is rough, scaly, and almost black in color, while on young trunks it is rich reddish-brown in color, and marked clearly with horizontally elongated short white lines. The inner bark has a characteristic bitter taste and prominent odor, due to the presence of hydrocyanic acid.

When in bloom the tree may be recognized by its white flowers, which are arranged in drooping conical spikes. Its leaves are narrowly egg-

WILD CRAB APPLE

1 = A flowering branch; 2 = longitudinal section of a flower enlarged; 3 = a fruiting branch; 4 = section of a fruit, natural size; 5 = a winter twig. natural size; 6 = winter twig enlarged

shaped, long-pointed, and sharp-toothed. Its fruit is a drupe about the size of a large pea, containing a small stone surrounded by a dark-purple flesh covered by a shiny black skin. The fruits are arranged in loose drooping spike-like clusters, and are slightly bitter.

The Wild Black Cherry is one of the most important hardwood timber-trees in the eastern United States. It supplies the cherry wood of commerce. The wood is hard, strong, fine-grained, polishes well, does not warp or split, and is reddish-brown in color. It weighs about thirty-seven pounds per cubic foot, and is used principally for furniture and finish.

American Crab Apple

PYRUS CORONARIA *Linnæus*

FAMILY.—Rose.

OTHER NAMES.—Wild Crab Apple; American Crab; Crab; Wild Crab; Fragrant Crab.

GENERAL DESCRIPTION.—*Shape:* crown broad and round-topped, consisting of slender, spreading, crooked branches; trunk short and furrowed. *Height:* up to 25 feet with a diameter of 14 inches. *Bark:* reddish-brown, scaly, furrowed. *Buds:* bright red, blunt-pointed, 1/8 to ¼ of an inch long, covered with 4 to 8 visible scales. *Leaves:* alternate, simple, ovate, 3 to 4 inches long. *Flowers:* appear in May or June; fragrant, rosy-white, 1½ to 2 inches across, arranged in small clusters. *Fruit:* a small, yellowish-green apple, 1 to 1¼ inch in diameter, ripens about October.

PREFERRED HABITAT.—Rich, moist soil in thickets and open woods.

RANGE.—Ontario to South Carolina and Alabama, west to Michigan, Missouri, and northern Louisiana.

IT is often said that the early pioneer was sure to have an apple-tree in his lawn and a dog by his side. Quite often the apple-tree in his lawn was the Wild Crab Apple.

The Wild Apple of America, generally known as Wild Crab, has many striking distinguishing characteristics. Some people plant this tree in their lawns on account of the beautiful color and fine smell of its flowers. The greatest charm of this tree lies in its fragrant blossoms, which resemble those of the domestic apple, but are somewhat deeper tinted with red and also more fragrant.

This tree rarely exceeds 20 feet in height and has a crown made up of rigid contorted branches, which are a helpful means of identification.

Its fruit is a small, yellowish-green apple. It ripens about October, but may hang on the tree far into winter. If they remain on the ground under the tree during the winter they acquire a yellow color, but do not lose their bitter taste. They seldom rot before spring, and so far no use has been found for them except in the making of jellies and cider.

Peter Kalm, who was one of the twelve men whom the great naturalist Linnaeus called his apostles, wrote that "the crab-tree is very plentiful in Pennsylvania, where it grows in woods and glades and produces flowers with a very pleasant smell, somewhat like the raspberry."

BLACK LOCUST

1 = A flowering branch; 2 = a fruiting branch; 5 = section of a winter twig, enlarged

THE PULSE FAMILY

LEGUMINOSÆ

THE Pulse Family comprises 460 different groups of well-known trees, shrubs, and herbs, with a total membership of more than 7,000 distinct species.

Many of our common domestic and foreign plants belong to this family. Some of our valuable food plants, such as the peas, beans, clover, and peanuts, are among its representatives.

Numerous important commercial products are derived from some of its members. Senna, which is extensively used on account of its laxative properties, is derived from the leaves of a few species of Cassia native to Africa. Logwood, regarded as the most valuable of the vegetable dyes, is procured from the heartwood of a tree native to the West Indies. Indigo is also derived from a member of this family.

Probably the most interesting of all its members is the Sensitive Plant, which is cultivated extensively in our greenhouses and used widely in plant experimentation work.

The Pulse family has some important timber trees among its representatives. The following four groups have representatives which are famed for their ornamental qualities and valuable wood:

Common Name	Scientific Name
1. The Locusts.	Robinia.
2. The Honey Locusts	Gleditsia.
3. The Redbuds.	Cercis.
4. The Coffee Trees.	Gymnocladus.

Black Locust

Robinia pseudo-acacia *Linnæus*

Family.—Pulse.

Other Names.—Common Locust; Yellow Locust; White Locust; Locust, Acacia.

General Description.—*Shape:* narrow and oblong. *Height:* 40 to 50, sometimes 75 feet. *Bark:* reddish-brown, on old trunks rough and deeply furrowed, on young

KENTUCKY COFFEE TREE

1 = Staminate flowers; 2 = pistillate flowers; 3 = portion of a doubly compound leaf; 4 = fruit pods with a portion of one pod removed showing two seeds; 5 = section of a winter twig showing superposed and inconspicuous buds, lenticels, pith, and leaf-scars with bundle-scars; 6 = section of a winter twig, slightly enlarged

trunks greenish to brown; twigs bear two spines at nodes. *Pith:* white and angular in cross section. *Buds:* small, inconspicuous, imbedded in twig, often 3 to 4 above each other. *Leaves:* alternate, compound, 8 to 14 inches long, with an odd number of leaflets. *Leaf-scars:* large, conspicuous, irregular in outline, contain 3 bundle-scars. *Flowers:* resemble sweet pea, cream-white, fragrant, appear about May, and are arranged in drooping clusters about 5 inches long. *Fruit:* a small, thin, dark-brown pod about 4 inches long and ½ of an inch wide, containing 4 to 8 dark-brown mottled seeds.

PREFERRED HABITAT.—Grows on almost any kind of soil, but does not endure dense shade.

RANGE.—Mountains of Pennsylvania to Iowa, south to Georgia and Kansas.

AT all seasons of the year the Black Locust may be identified by deeply furrowed dark-brown bark on the old trunks, the greenish to reddish-brown brittle twigs armed with two short spines at each node, and the yellowish-brown heartwood, which begins to form as early as the fourth or fifth year of the tree's life.

The compound leaves, with seven to nine leaflets, are a reliable means of identification. Each leaf is from eight to fourteen inches long, and bears an odd number of leaflets. The leaflets are egg-shaped in outline, about one inch long, and turn brownish-yellow in autumn.

The flowers are cream-white in color, resemble the blossoms of a pea, and are arranged in drooping clusters. The fruit consists of a dark-brown thin pod, about three inches long and one-half of an inch wide. Each pod contains from four to eight small dark-brown mottled seeds.

The wood is heavy, hard, strong, durable, and yellowish to brownish in color. It weighs about forty-six pounds per cubic foot and is in great demand for special uses. It has no superior for fence posts and for fuel-wood. Most of the insulator pins, used by the millions on telephone and telegraph poles, are made of locust wood. During the recent war much locust wood was used in the manufacture of tree nails employed in the construction of wooden ships.

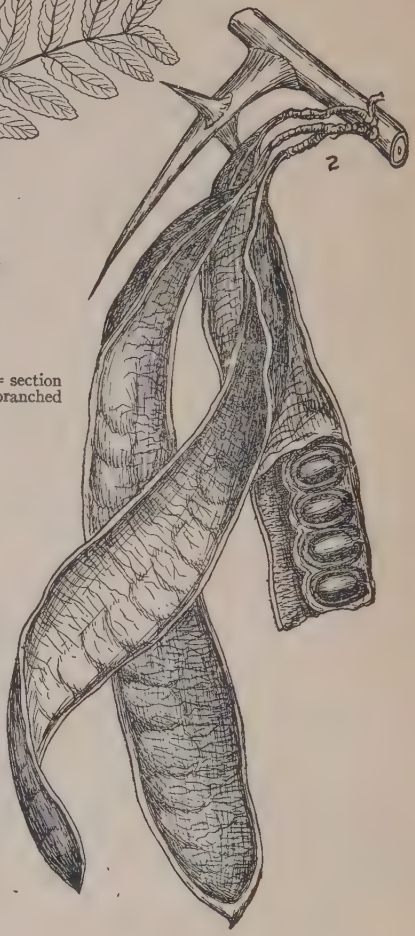
KENTUCKY COFFEE TREE

GYMNOCLADUS DIOICA (*L.*) *Koch*

FAMILY.—Pulse.

OTHER NAMES.—Mahogany; Coffee Nut; Nigger Tree.

GENERAL DESCRIPTION.—*Shape:* crown narrow, high, composed of few stout branches. *Height:* 40 to 80, sometimes 100 feet. *Bark:* dark gray to brown, rather rough, covered with shallow furrows; on twigs greenish-brown and covered with a whitish scaly film. *Pith:* wide, pink to brown in color. *Buds:* small, downy, imbedded in twigs, occur above one another. *Leaves:* alternate, very large, 1 to 3 feet long, 1 to 2 feet wide, twice compound. *Leaf-scars:* broadly U-shaped, pale in color, contain 3 to 5 bundle-scars. *Flowers:* greenish-white, appear about June in large spikes 6 to 8 inches long. *Fruit:* a broad,



HONEY LOCUST

1 = Flowering branch with mature leaves; 2 = section of a branch with fruiting pods and a branched tho-

flat, stubby, leathery, reddish-brown pod 4 to 10 inches long and containing 6 to 9 hard dark-brown seeds.

PREFERRED HABITAT.—Rich bottom-lands and along moist foothills.

RANGE.—Central New York to Minnesota, south to Tennessee and Oklahoma.

THE Kentucky Coffee Tree seems to be a comparatively rare tree throughout its entire range. It attracts attention wherever it grows on account of its unusual features.

The trunk is short, and soon divides into two to four secondary stems. The dark-gray to dark-brown bark is of medium thickness, and roughened by very sharp and firm projecting ridges. The reddish inner bark is often visible at the base of the bark furrows.

The twigs are stout, clumsy, without thorns, and greenish-brown. They are often coated with a whitish crusty film, and occasionally with fine hairs, and marked with large heart-shaped leaf-scars.

The pith is large, round, and pinkish to reddish-brown. The buds are all lateral, no terminal buds being present. They are small, covered with minute hairs, almost entirely imbedded in the twig, and placed above one another. The uppermost bud is usually the largest. The lower buds are smaller, less evident, and located within the depression on the upper margin of the leaf-scar.

The leaves are twice compound, one to three feet long and up to two feet broad. The ovate and entire-margined leaflets are very distinctive. They occur on lateral stalks, except the lower pair, or occasionally two pairs.

The thick, stubby, woody, and persistent fruit-pods with their large dark-brown seeds cannot be confused with those of any other native or introduced tree. The large terminal racemes or raceme-like corymbs of regular and greenish-white flowers, which appear about June, are also distinctive.

The Kentucky Coffee Tree is planted locally as an ornamental tree. It has no special merits other than its unusual appearance and striking characteristics.

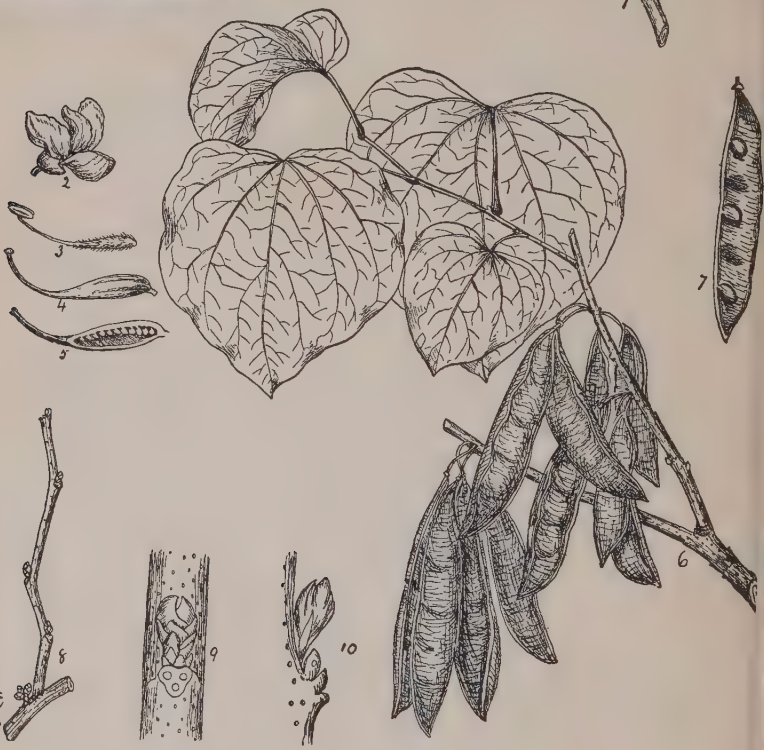
HONEY LOCUST

GLEDITSIA TRIACANTHOS *Linnæus*

FAMILY.—Pulse.

OTHER NAMES.—Sweet Locust; Thorn Tree; Three-thorned Acacia; Honey Shucks.

GENERAL DESCRIPTION.—*Shape:* broad and round-topped. *Height:* 60 to 80, sometimes 140 feet. *Bark:* on old trunks grayish-brown to black, roughened by shallow furrows; on young trunks smooth, reddish-brown, covered with pale dots, and bears numerous three-pronged thorns. *Buds:* small, inconspicuous, brownish, 3 to 5 at a node. *Leaves:* alternate, once or twice compound, 7 to 8 inches long, bearing an even number of leaflets. *Flowers:* greenish, appear in May and June; pollen-bearing are arranged in short spikes,



REDBUD

1 = A flowering branch; 2 = a single flower; 3 = a single stamen, enlarged; 4 = a single pistil, enlarged; 5 = a pistil with the ovary sectioned so as to show the ovules, enlarged; 6 = a fruiting branch; 7 = an opened pod, showing the seeds; 8 = a winter twig; 9 = section of the winter twig, enlarged; 10 = portion of a winter twig, showing arrangement of buds

and seed-bearing in small clusters. *Fruit:* a flat, thin reddish-brown pod about 10 to 18 inches long, containing many small, flat, brownish seeds.

PREFERRED HABITAT.—Rich, fertile soil. Common in bottom-lands and along streams.

RANGE.—Ontario to Kansas, south through Pennsylvania to Florida and Texas.

THE Honey Locust is a tree which so much resembles the Black Locust in its fruit, wood, and leaves that one does not wonder that it is called a Locust.

The surest means of identification is the formidable thorns found upon the main trunk and the larger branches. These unusual thorns are often four to six inches long and usually three-pronged. They may occur solitary or in dense clusters.

Throughout the summer the once-compound or sometimes twice-compound leaves with an even number of leaflets are distinctive, and during autumn and winter the thin leathery brown fruit-pods, which sometimes reach a length of eighteen inches, cannot be confused with the fruit of any other tree. Each pod contains about twenty chocolate-brown seeds.

The grayish-brown to black bark on old trunks roughened by shallow furrows separating hard projecting ridges and the numerous and conspicuous oblong and brown dots (lenticels) on the branches are positive distinguishing characteristics.

The buds are by no means the least distinctive organs of the tree. If one cuts a twig lengthwise and examines the cut surface carefully the buds may be observed. As a rule, five separate buds occur above each other, the upper ones being scaly and barely visible, while the lower ones are not scaly and entirely hidden beneath the bark. No other of our common trees has such a bud arrangement.

The Honey Locust is hardy, easily propagated, grows rapidly, produces valuable wood, and has few enemies.

REDBUD

CERCIS CANADENSIS *Linnæus*

FAMILY.—Pulse.

OTHER NAME.—Judas Tree.

GENERAL DESCRIPTION.—*Shape:* a small tree with short trunk and broad crown. *Height:* 15 to 25, sometimes 50 feet. *Bark:* reddish-brown, scaly. *Buds:* small, 1/8 of an inch long, blunt-pointed, often occur above each other, covered with purplish red scales. *Leaves:* alternate, simple, heart-shaped, 3 to 5 inches long. *Flowers:* resemble the sweet pea, appear in early spring before the leaves, 4 to 8 in a cluster. *Fruit;* a small, light-brown, short-stalked pod, 2 to 3 inches long, ½ of an inch wide.

PREFERRED HABITAT.—Rich and fertile lowland soil and moist hillsides. Common in abandoned fields, cut-over land, and burnt-over areas.

RANGE.—Ontario to Minnesota, south through New Jersey to Florida, and west to Arkansas.

WHEN a large shrub or small tree is desired for ornamental planting, no more desirable one can be found than the Redbud. It is common in the woodlands as far north as Pennsylvania, and occurs locally farther northward.

No native tree has more striking features than this species possesses. Its simple, heart-shaped leaves are truly distinctive. Its flowers are pinkish in color, resemble the sweet pea in outline, and appear before the leaves in clusters of four to eight. Sometimes this tree forms thickets, and the flowers are produced in such large numbers that an entire hillside appears like an unbroken sea of blossoms. When in full bloom it is the most conspicuous feature of the landscape. Not even the Flowering Dogwood, or Shad Bush, challenges it to divide honors.

The flowers are succeeded by small fruit-pods which show their family relationship. The pods are thin, two to three inches long, one-half of an inch wide, and light brown to deep rose in color. They occur in dense clusters, and often persist into winter.

A careful examination of the light-brown winter twigs will show very impressively the source of the common name Redbud. The numerous buds are truly purplish-red in color. Some of them occur singly along the twigs, while many of them are placed in a vertical row above the leaf-scars, and rather frequently a cluster of three or more buds may be found in the axils below the origin of the lateral branches. No other native tree develops its buds in such an unusual place.

THE SUMACH FAMILY

ANACARDIACEÆ

THE Sumachs comprise a large number of trees and shrubs. About 120 different kinds are known, but most of them are found in South Africa, only sixteen species being native to North America.

The Common Poison Ivy (*Rhus toxicodendron*, L.) and the Poison Sumach (*Rhus vernix*, L.) are members of this group of plants. Both species are very poisonous. The former may be recognized by its smooth twig, compound leaves with three leaflets, and white berry-like fruit, and the latter may be distinguished by its smooth and rather stout twigs bearing a terminal bud, compound leaves with seven to thirteen shiny leaflets, and white berry-like fruit arranged in drooping clusters. The non-poisonous Sumachs have erect red fruit, while the poisonous have drooping white fruit.

Staghorn Sumach

RHUS TYPHINA *Linnæus*

FAMILY.—Cashew.

OTHER NAMES.—Hairy Sumach; Velvet Sumach.

GENERAL DESCRIPTION.—*Shape:* small tree with broad, flat-topped crown. *Height:* 10 to 20, sometimes 40 feet. *Bark:* rich in tannin, on old trunks rough and dark brown, on young trunks smooth, thin, covered with numerous large yellowish-brown dots (lenticels). *Buds:* small, conical, rusty brown, hairy. *Leaves:* alternate, compound, 16 to 24 inches long with 11 to 31 leaflets. *Leaf-scars:* U-shaped, nearly encircle buds, contain 3 groups of bundle-scars. *Flowers:* appear about May and are arranged in panicles 5 to 12 inches high and 4 to 6 inches broad. *Fruit:* small, round, drupes arranged in conspicuous red heads 5 to 8 inches long and 4 to 6 inches broad.

PREFERRED HABITAT.—Fertile dry soil. Rare in wet places. Common in abandoned mountain fields.

RANGE.—New Brunswick to Minnesota, south to Georgia and Alabama.

THE Staghorn Sumach is the largest of the several kinds of Sumachs found in eastern North America. No other native or introduced tree or

STAGHORN SUMACH

1 = Branch with a flower panicle and mature leaves; 2 = a staminate flower, enlarged; 3 = a pistillate flower, enlarged; 4 = an erect cone-like fruit cluster; 5 = a single hairy fruit, enlarged; 6 = a hairy winter twig; 7 = a bud almost surrounded by a leaf-scar with bundle-scars, enlarged; 8 = a leaf-scar, enlarged

shrub is easier to identify. The stout branches are covered throughout the year by a dense velvety coating of hairs. The bark on the trunk is dark brown, somewhat scaly, marked with yellowish raised dots, and contains tannin.

The country boy has a sure method of becoming acquainted with this tree. Upon cutting its twigs he finds that a milky and gummy secretion flows forth from the cut section. It adheres to the skin or knife-blade, and turns black immediately upon exposure.

In spring and summer the alternate large compound leaves, with eleven to thirty-one leaflets, and covered with a dense coating of hairs, are distinctive. During May and June the dense yellowish-green panicles of flowers are very positive means of identification.

Its most impressive distinguishing characteristic is its conspicuous bright red clusters of fruit arranged in erect heads about seven inches long and three inches wide.

A distinctly porous, brittle, rather satiny orange-colored wood is found in the stem. It weighs about twenty-seven pounds per cubic foot. In some localities the pith is removed from short sections of twigs, which are then used as crude spigots to convey the sap of Sugar Maple trees into buckets.

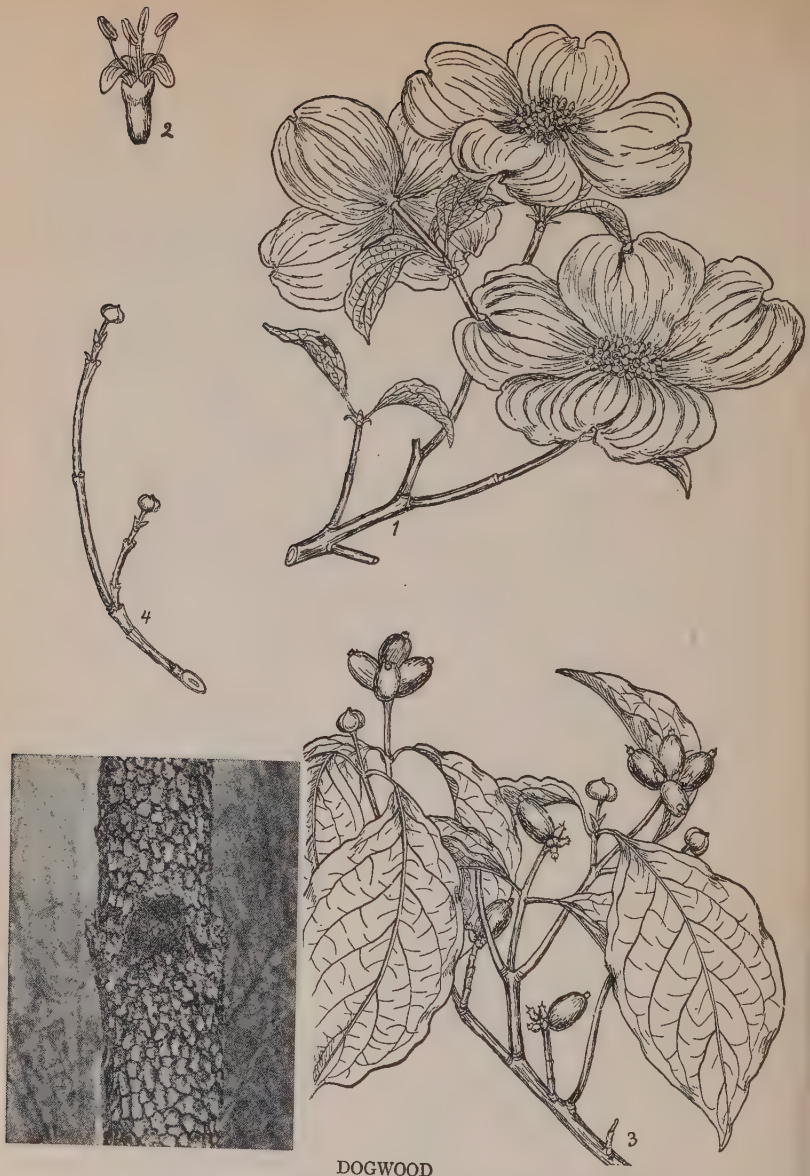
THE DOGWOOD FAMILY

CORNACEÆ

THE Dogwood Family comprises fifteen different groups of plants found chiefly in temperate regions. The only two groups which have representatives in North America are the Dogwoods and the Gums.

The Dogwoods comprise forty different kinds of plants, chiefly trees and shrubs. They are distributed widely in temperate regions, and some of them yield a very hard and valuable wood. Fifteen species have been identified in North America. Most of them are shrubs, only three attaining tree size. One species is a low herb, and grows extensively in the northern woods.

The Gums, belonging to the group of trees known techni-



DOGWOOD

1 = A flowering branch with three clusters of flowers, each surrounded by a showy four-bracted white involucre; 2 = a single flower, enlarged; 3 = a fruiting branch with mature leaves; **4** = a winter twig with two terminal spherical flower-buds

cally as *Nyssa*, comprise only a few species, and have a rather restricted distribution. Only seven species are known in the world, five of which are native to the eastern United States and two of them are found in southern Asia.

Flowering Dogwood

Cornus florida *Linnæus*

Family.—Dogwood.

Other Names.—Flowering Cornel; Dogwood; Boxwood.

General Description.—*Shape:* bushy, low-crowned, broad-topped. *Height:* 15 to 25, sometimes 40 feet. *Bark:* bitter, ill-smelling, reddish-brown to black, broken up into square blocks. *Buds:* flower-buds large, round, goblet-like; leaf-buds small, sharp-pointed, sometimes barely visible. *Leaves:* opposite, simple, ovate, sharp-pointed, wedge-shaped at base, and entire on margin *Flowers:* appear April to June, arranged in dense heads, and surrounded by four large, white, leaf-like bracts. *Fruit:* a scarlet, egg-shaped berry.

Preferred Habitat.—Thrives best in low. moist, and rather fertile situations. Usually found in the understory of the forest, along fence rows, and in waste places.

Range.—Massachusetts to Michigan and Missouri, and south to Florida and Texas.

The Flowering Dogwood is one of the best-known small trees of the forests of eastern North America. In spring the tree is often so densely covered with pretty white flowers that it appears like an enormous bouquet. At this season it is the glory of the understory of the forest. In summer its dense and deep green foliage gives it character, and in autumn the small clusters of scarlet berries and the dark red autumnal coloration of the leaves are a sure means of identification.

It has the most distinctive flower buds of any American tree. They resemble a goblet in outline, are about one-fifth of an inch in diameter, occur at the end of the branches, and are covered with two opposite pairs of bud scales. This tree has two other distinguishing characteristics, which are present at all seasons of the year, namely, the bitter, ill-smelling, reddish-brown to black bark, which breaks up into squarish blocks, and the reddish twigs, which are often streaked with green. If one has a pocket-knife and is willing to bore through the outer bark, he will find a pink inner bark, a characteristic which no other tree possesses in such good measure.

The wood is very hard, strong, tough, pale reddish to pinkish in color, and weighs over fifty pounds per cubic foot. Shuttles, golf-stick heads, brush blocks, engravers' blocks, and tool handles are some of its principal uses.

BLACK GUM

1 = A pistillate flowering branch; 2 = a staminate flowering branch; 3 = a fruiting branch with mature leaves; 4 = a winter twig, natural size; 5 = section of a winter twig, enlarged

Black Gum

Nyssa sylvatica *Marshall*

Family.—Dogwood.

Other Names.—Sour Gum; Tupelo; Pepperidge.

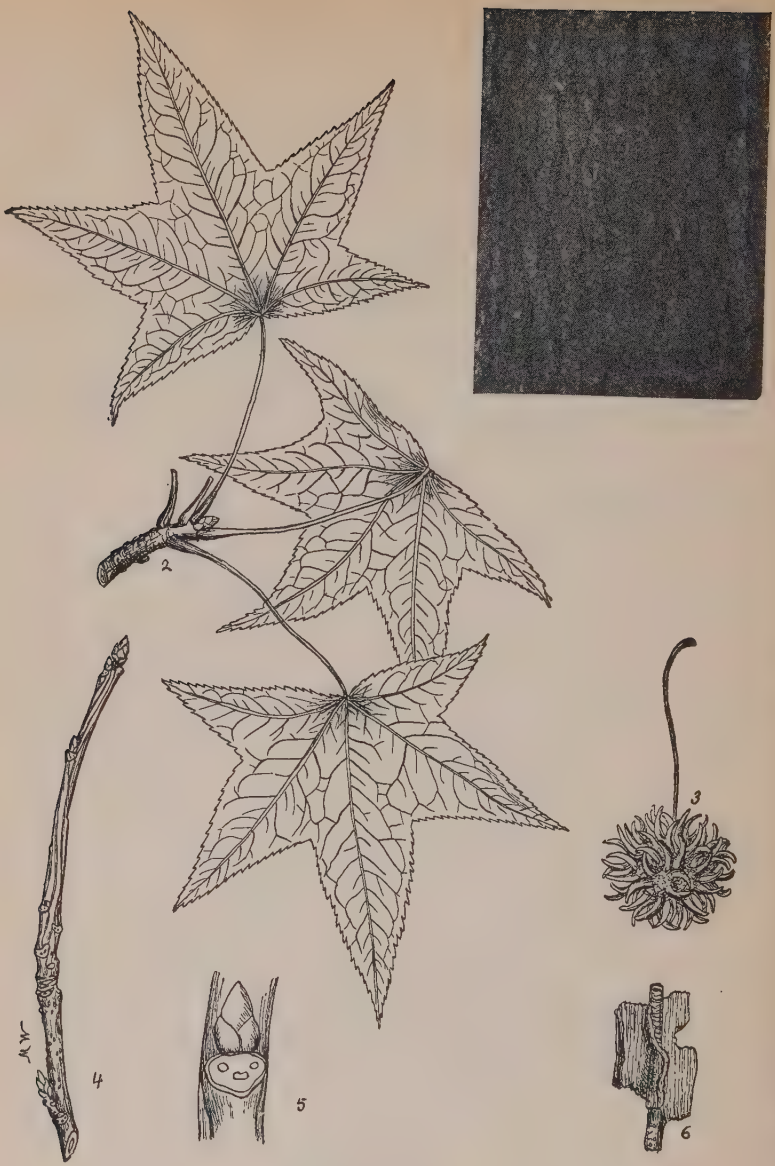
General Description.—*Shape:* low and flat-crowned; trunk continuous; lateral branches often horizontal. *Height:* 40 to 50, sometimes 100 feet. *Bark:* on twigs smooth and grayish-brown; on young trunks grayish and scaly; on old trunks rough, deep-fissured, broken up into squarish blocks. *Buds:* egg-shaped, ¼ of an inch long, covered with 3 to 5 reddish-brown scales. *Leaves:* alternate, simple, egg-shaped, 2 to 5 inches long, deep green and shiny, entire on margin. *Leaf-scars:* broadly crescent-shaped with three distinct bundle-scars. *Flowers:* appear in May or June in small inconspicuous clusters on short stalks. *Fruit:* a dark-blue fleshy berry about ½ of an inch long.

Preferred Habitat.—Reaches its best development along streams and in low, wet places.

Range.—Maine to Florida, and west to Michigan and Texas.

There is a great lack in the uniformity of the common names of this tree. It is known as Black Gum in fifteen States, as Sour Gum in fourteen, as Tupelo in eleven, and Pepperidge in eight of them. The stem usually rises to the top of the tree without dividing, bears drooping lateral branches near the base, horizontal along the middle, and ascending near the top. On old trunks the rough, deep-fissured bark, which breaks up into squarish blocks, is very distinctive. The smooth grayish-brown twigs bearing broadly crescent-shaped leaf-scars, and with three distinct bundle-scars and reddish-brown buds, are helpful means of identification in winter. During the summer the simple, shiny, dark-green, and entire-margined leaves arranged in horizontal sprays are good and positive distinguishing characteristics. Nobody can fail to recognize the Black Gum in autumn, when its dark-purple drupes are ripe and the foliage becomes a glowing mass of scarlet, sometimes touched with dashes of orange. It is unquestionably the most brilliant of all the gayly colored trees of hardwood forests.

The wood is light-yellow, cross-grained, hard to work, moderately strong and stiff, and not durable when in contact with the soil. Its grain is so twisted and interwoven that it is almost impossible to split the wood. The wood weighs about thirty-seven pounds per cubic foot, and is used for hubs of wheels, rolling pins, chopping bowls, rollers for wire ropes, ox-yokes, and pulpwood.



SWEET GUM

2 = A branch with mature leaves; 3 = a spherical fruit; 4 = a winter twig; 5 = section of a winter twig, enlarged; 6 = section of a branch with corky projection

THE WITCH-HAZEL FAMILY

HAMAMELIDACEÆ

THE Witch-hazel Family contains sixteen different groups of trees and shrubs which are found in regions bordering the tropics. Two of the sixteen groups have a single tree representative each in the United States. They are:

1. The Witch-hazel. 2. The Sweet Gum.

The Witch-hazel is the only tree or shrub native to the eastern United States which flowers and fruits at the same season of the year. It produces its brilliant yellow flowers late in autumn, which develop into fruit which matures the following autumn. Only three species of Witch-hazel are known in the world, two of which are found in eastern Asia and the other is native to the United States.

Our native Sweet Gum is one of three species belonging to the group and known under the scientific name *Liquidambar*. The other two species are native to Asia.

Sweet Gum

LIQUIDAMBAR STYRACIFLUA *Linnæus*

FAMILY.—Witch-hazel.

OTHER NAMES.—Liquidambar; Red Gum; Bilsted.

GENERAL DESCRIPTION.—*Shape:* handsome, symmetrical, often conical. *Height:* 50 to 75, sometimes 150 feet. *Bark:* on old trunks light brown to dark gray; on twigs light brown with corky-winged projections. *Buds:* glossy, fragrant if crushed, covered with about 6 rich reddish-brown scales. *Leaves:* alternate, simple, star-shaped, 3 to 5 inches long, broader than long. *Leaf-scars:* crescent-shaped, contain 3 bundle-scars. *Flowers:* appear about April in heads suspended on slender stalks. *Fruit:* long-stalked spherical head, made up of many capsules with spine-like projections.

PREFERRED HABITAT.—Prefers rich soil, endures swamps, but does not tolerate dense shade.

RANGE.—Southern Connecticut to Florida and Guatemala, and west to Missouri and Texas.

THE Sweet Gum is intimately linked with the life of the southern plantations, for it is recorded that many a slave sought shelter temporarily in

Photo by U. S. Forest Service

HOLLY

1 = A pistillate flowering branch; 2 = a staminate flowering branch; 3 = a fruiting branch; 4 = cross-section of a fruit, enlarged; 5 = longitudinal section of a fruit, enlarged; 6 = section of a twig, enlarged

the hollow trunk of a large Sweet Gum tree located in the numerous, rather inaccessible, swamps of the South, and there awaited the occasion when he could make his escape northward in safety.

It has many striking distinguishing characteristics at all seasons of the year. No other tree in the United States has such typical star-shaped leaves. In summer, the upper surface of the leaves is lustrous green in color, and their autumnal coloration is a conflagration of red, yellow, and purple. The fruit is unique, consisting of a long-stalked spherical head, made up of projecting and sharp-pointed capsules, and often persists far into winter. The twigs bear corky-winged projections, which are present at all seasons of the year, and serve as an excellent means of identification. The buds, if crushed, give forth a fragrant odor.

The Sweet Gum attains a large size in the southern portion of its range, and produces a rather valuable wood, which weighs about thirty-seven pounds per cubic foot, and is used extensively for boxes, crates, furniture, interior finishings, and as a successful substitute for Circassian Walnut.

THE HOLLY FAMILY

AQUIFOLIACEÆ

THE Holly Family comprises three different groups of trees and shrubs with a total membership of 290 species. Most of the representatives occur in temperate and tropical regions. Seventy distinct species have been identified in northern Brazil.

The American Holly and the closely related European Holly are the two species which have been used extensively for ornamental planting and are linked inseparably with our Christmas traditions. The European Holly has been propagated so long and intensively that 153 distinct varieties are now recognized.

American Holly

ILEX OPACA *Aiton*

FAMILY.—Holly.

OTHER NAMES.—Holly; Christmas Holly; White Holly.

GENERAL DESCRIPTION.—*Shape:* trunk short, rather slender; crown conic with slender ascending lateral branches. *Height:* 15 to 30, sometimes 50 feet. *Bark:* close-fitting,

smooth, grayish, rough on old trunks. *Buds:* small, inconspicuous, blunt-pointed, somewhat hairy. *Leaves:* alternate, simple, evergreen, thick, oval, wavy on margin, armed with spiny teeth. *Flowers:* small, white, occur in clusters, appear from April to June. *Fruit:* a bright red berry about the size of a pea.

PREFERRED HABITAT.—Usually found in moist soil bordering streams or swamps.

RANGE.—A coastal plains and southern species occurring from southern Maine to Florida, and westward to Missouri and Texas.

MANY people are familiar with the leaves and fruit of the American or Christmas Holly, but few know that they grow upon trees which are common in the coastal plains region of the South, and grow as far north as Pennsylvania and along the Atlantic coast to southern Maine.

Holly leaves are regarded by devout Christians as a symbol of the Saviour's crown of thorns. The holly wreath is attractive and popular, but unfortunately the method of collecting the branches is very destructive. In many instances the tops of trees are cut out completely, leaving nothing but an erect bare trunk.

The American Holly can readily be recognized at all seasons of the year by its distinctive alternate, deep-green leaves, which are armed with spines along the border. The small bright red berries are also a helpful means of identification in fall and early winter. The European Holly resembles it somewhat, but has deeper green leaves, with more wavy margin and translucent edges, and deeper red berries.

The wood is chalky-white in color, weighs about thirty-six pounds per cubic foot, and is used for piano and organ keys, in tannery, cabinet making, interior finishings, and in the manufacture of cheese boxes.

The American Holly is occasionally planted for ornamental purposes, and may be classified as one of our most attractive small trees.

THE MAPLE FAMILY

ACERACEÆ

ALL the members of the Maple Family with a single exception belong to one group known by the scientific name *Acer*. This group embraces all the trees, shrubs, and a few vines known commonly as Maples, and used extensively throughout the northern hemisphere for ornamental and forestry purposes.

There are thirteen Maples native to the United States, and each one of them possesses a number of striking distinguishing characteristics. These thirteen species show a wider variation in their organs than any other group of native trees. Their leaves may be simple or compound; large or small, and smooth or hairy. Their twigs range from slender to stout, and may be green, gray, brown or red in color. Their flowers may occur in small lateral clusters, in long terminal spikes, or in drooping clusters, and appear before, with or after the leaves. The fruit of all the Maples takes the form of the well-known maple key, but that of each separate species has some distinctive features.

The Maples also show a wide range of preference for sites upon which to grow. The Red, Silver, and Ash-leaved Maples prefer wet to moist habitats. The first species is found both in lowlands and highlands, but the other two, as a rule, remain in the lowlands. The Sugar Maple prefers well-drained rich soil, and will grow in the valleys and on the mountains. The Striped Maple prefers rich situations in the mountains, while the Mountain Maple thrives on rocky, exposed, and dry situations on the mountain-tops.

The Maples have met with such favor as ornamental trees that a large number have been imported, among them being the Norway Maple, Sycamore Maple, and the Japanese Maples. One of the commonest shade trees in our cities is the Norway Maple. It may be distinguished from most others by the fact that a milky fluid flows from the stalks of the leaves if pressure is exerted upon them. Its crown is low, compact, and round-topped. The leaves somewhat resemble those of the Sugar Maple, but the latter has broader teeth and blunter points. The twigs of Norway Maples are stout, stiff, and bear blunt-pointed red buds.

The Sycamore Maple, which is rather common along streets and in parks, may be recognized in summer by its stout and rather rigid leaves, with five large lobes and a fine-toothed

SUGAR MAPLE

1 = Branch with immature leaves and staminate blossoms; 2 = staminate flower with calyx, enlarged; 3 = longitudinal section of staminate flower, enlarged; 4 = branch with immature leaves and pistillate blossoms; 5 = pistillate flower with calyx, enlarged; 6 = longitudinal section of flower with both a pistil and stamens enlarged; 7 = branch with mature leaves and cluster of fruit; 8 = a maple key with exposed seeds; 9 = winter twig showing lenticels, leaf-scars, bud-scale scars, and sharp-pointed opposite buds

margin. In winter it may be distinguished by its stout twigs, bearing large, blunt-pointed, green buds.

The Japanese Maples were, as their name implies, imported from Japan, and have been set out extensively on lawns and in parks. They may be recognized by their deep reddish-purple coloring and deeply and finely cut leaves. In some varieties the leaves are cut almost to the midrib, and present a fringe-like effect.

Sugar Maple

ACER SACCHARUM *Marshall*

FAMILY.—Maple.

OTHER NAMES.—Hard Maple; Rock Maple.

GENERAL DESCRIPTION.—*Shape:* spreading, egg-shaped, round-topped crown. *Height:* 60 to 75, sometimes 120 feet. *Bark:* on branches and young trunks smooth and light-brown; on old trunks brown, hard, roughened by shallow fissures. *Buds:* conical, sharp-pointed, clustered at end of twigs, covered with 8 to 16 exposed brown scales. *Leaves:* opposite, simple, usually five-lobed, wavy on margin, 3 to 5 inches long, 4 to 6 inches wide, bright green above, pale green below. *Leaf-scars:* V-shaped to U-shaped, nearly encircle twigs. *Flowers:* small, bell-shaped, appear in April and May with the leaves, arranged in drooping clusters. *Fruit:* a winged key, ½ to 1 inch long, matures about September, arranged in drooping clusters.

PREFERRED HABITAT.—Well-drained, rich soil.

RANGE.—Newfoundland to Manitoba, south to Florida and Texas.

THE Sugar Maple is probably the best known hardwood tree native to North America. Its beauty, cleanliness and healthy appearance are known to all who have visited the Northwoods.

This prince of our forest trees is distinguished easily at all seasons of the year. The brown bark on old trunks is roughened by shallow furrows, and the slender brown twigs are marked with pale dots (lenticels).

Its leaves are large, simple, thin in texture and have their lobes coarsely toothed. The flowers appear with the leaves. The fruit clusters are usually developed from terminal buds. Its fruit does not mature until September, while the fruit of the Red Maple and Silver Maple ripens in early summer.

The Sugar Maple produces immense numbers of seeds, which germinate soon after falling to the ground and develop into small seedlings.

In winter the opposite sharp-pointed, conical buds covered with eight to sixteen exposed brown scales are a sure means of identification.

The wood of the Sugar Maple is heavy, hard, strong and fine-grained. It has a smooth, satiny surface, polishes well, splits easily, and when burned as fuel produces much heat.

SILVER MAPLE

1 = Flowering branch; 2 = branch with mature leaves and mature fruit; 3 = a wing of a maple key with exposed seed; 4 = a seed, enlarged; 5 = end view of a seed, enlarged; 6 = a winter twig showing buds, lenticels, leaf-scars, bud-scale scars and bundle-scars

The Sugar Maple deserves to be protected carefully in the forests. It lives long, produces valuable wood, yields delicious syrup and sugar, furnishes excellent shade, and possesses some of the cleanest and most beautiful features of any American tree. As a Memorial Tree, the Sugar Maple has no superior.

Silver Maple

ACER SACCHARINUM *Linnæus*

FAMILY.—Maple.

OTHER NAMES.—White Maple; River Maple; Soft Maple.

GENERAL DESCRIPTION.—*Shape:* short-trunked, broad-crowned, with long, drooping, lateral branches. *Height:* 50 to 60, sometimes 120 feet. *Bark:* on branches and young trunks smooth and gray; on old trunks brown and scaly. *Buds:* opposite, red, blunt-pointed, covered with 6 to 8 overlapping scales. *Leaves:* opposite, simple, 5-lobed, deeply toothed, bright green on upper surface, and silvery white on lower surface. *Flowers:* appear in March or April before the leaves are out; occur in dense axillary clusters along twigs. *Fruit:* a two-winged key, 1 to 2 inches long, and occurs in clusters; mature about May.

PREFERRED HABITAT.—Moist, deep soil, common along streams and in swamps.

RANGE.—New Brunswick to southern Ontario, south to Florida and Indian Territory.

THE Silver Maple is a favorite with those who desire to secure shade with as little delay as possible. It grows rapidly, and adapts itself to a great variety of soils, but does not flourish upon dry situations. It likes the river banks and borders of ponds.

In summer the Silver Maple may be recognized by its leaves with a silvery-white lower surface and deep, round-based clefts. In winter it can be distinguished from all maples excepting the Red Maple by its numerous, round, red, collateral buds, and from the Red Maple by its bright chestnut-brown twigs, which give forth a pungent odor if broken.

Its bark is somewhat furrowed, and separates into thin, long scales, which are loose at both ends and fastened in the middle. The bending down of the branches and the distinct upward swoop of their small end is a very helpful distinguishing characteristic.

The Silver Maple has been planted widely for ornamental purposes. It is one of the first trees to bloom in spring, has an attractive, clean bark, produces beautiful leaves, and its outline and poise somewhat suggest an elm. Before planting it for ornamental purposes one should know that it is short-lived, and its branches are so brittle that they are frequently broken off in winter by the wind and snow and ice pressure.

RED MAPLE

1 = Flowering branch; 2 = branch with mature leaves and mature fruit; 3 = a maple key with exposed seeds; 4 = a winter branch; 5 = section of winter twig showing lenticels, a leaf-scar, and a gaping lateral bud, natural size; 6 = section of twig showing conspicuous lenticels and a cluster of accessory buds, natural size

Red Maple

ACER RUBRUM *Linnæus*

FAMILY.—Maple.

OTHER NAMES.—Soft Maple; Swamp Maple; White Maple.

GENERAL DESCRIPTION.—*Shape:* deep, broad and dense crowned and short trunked if grown in open; in dense stands trunk is long and crown shallow and round-topped. *Height:* 50 to 70, sometimes 100 feet, with a diameter of 4 feet. *Bark:* on branches and young trunks smooth and gray; on old trunks dark grayish, thick and shaggy. *Buds:* opposite, red, covered with 6 to 8 exposed scales; flower-buds stout, round; leaf-buds pointed, flattened. *Leaves:* opposite, simple, 3 to 5 lobed, bright green above and light green to whitish on lower surface; leaf-clefts shallow and sharp-based. *Flowers:* appear in March or April before the leaves; occur in dense clusters along twigs. *Fruit:* a two-winged key, usually less than 1 inch long, matures about May, grouped in small drooping clusters.

PREFERRED HABITAT.—Moist, deep soil. Common along streams and about swamps.

RANGE.—Nova Scotia to Manitoba, south to Florida and Texas.

THE Red Maple never forgets its common name. At all seasons of the year some part of it is distinctly red. Early in spring the red clusters of flowers appear, and red are the wings of the dainty, key-like fruit. In summer there is a tinge of red on the veins of the leaves, and in autumn the whole tree stands out among its neighbors as a flaming torch.

The Red Maple can be recognized in summer by its simple, rather small, 3 to 5 lobed leaves, which are light green to whitish on the lower surface. The clefts of the leaves are shallow and sharp-pointed at the base.

In winter we find the Red Maple bare of foliage and displaying its dark grayish, often knotty trunk, clean, smooth, grayish branches, and its bright red twigs loaded heavily with winter buds. In winter it is often difficult to distinguish the Red Maple from the Silver Maple. The latter, however, lacks the lustrous red twigs, and if the twigs of the Silver Maple are broken they give off a pungent odor not found in the Red Maple.

If there is one maple that excels all others in beauty in the forest it must be the Red Maple. It thrives when planted along village streets and in parks, but it is short-lived and needs plenty of moisture.

SWEET BUCKEYE

1 = A flowering branch; 2 = a flower with stigma below anthers, natural size; 3 = a flower with stigma above anthers, natural size; 4 = a fruiting branch; 5 = a fruit with part of shell removed showing two seeds; 6 = a seed; 7 = longitudinal section of a seed; 8 = a winter twig; 9 = section of a winter twig showing a leaf-scar with bundle-scars, natural size

THE SOAPBERRY FAMILY

SAPINDACEÆ

THE Soapberry Family is a large one. It comprises more than 1,000 different species, which are sometimes treated as members of the Horse-Chestnut Family, and a few writers consider them under the Buckeye Family.

The representatives of this family are commonest in the tropical region of the Old World. The Horse-Chestnuts and Buckeyes are the best known groups of the family. Ten species are native to the United States, and a number of them are fairly valuable timber trees and suitable for ornamental planting about the house, and especially along the streets of a city.

The Horse-Chestnut, which is a native to southeastern Europe, has been planted extensively throughout Continental Europe, Great Britain, and the United States. It is one of the best known shade and ornamental trees of the world. In Paris alone 17,000 trees are growing. It was introduced into the United States in 1746. When in bloom it is a superb sight, for in many instances entire trees appear to be covered with panicles of blossoms.

Sweet Buckeye

Aesculus octandra *Marshall*

Family.—Horse-chestnut; Soapberry.

Other Names.—Yellow Buckeye; Big Buckeye.

General Description.—*Shape:* medium-sized tree with a pyramid-like, round-topped crown. *Height:* 50 to 60, sometimes 110 feet. *Bark:* light brown to grayish-brown and breaking up into thin irregular scales. *Buds:* large, opposite, non-resinous, covered with numerous reddish-brown scales. *Leaves:* opposite, palmately compound, with 5, sometimes 7 leaflets, 4 to 10 inches long. *Leaf-scars:* large, heart-shaped with

three conspicuous bundle-scars. *Flowers:* small, yellow or purplish, arranged in large panicles, and appear about April or May. *Fruit:* a large leathery and smooth capsule containing several shiny reddish-brown nuts which mature in October.

PREFERRED HABITAT.—Rich bottom-land and valleys and moist mountain slopes.
RANGE.—Western Pennsylvania, south to Georgia, west to Iowa and Texas.

THE Sweet Buckeye can readily be distinguished in summer by its large palmately compound leaves, with usually five leaflets, and its large panicles of yellowish to purplish flowers.

Another Buckeye is native to the central part of the United States. It is known as the Fetid Buckeye, or Ohio Buckeye (*Æsculus glabra* Willd.), and can be distinguished very easily from the Sweet Buckeye. The stamens of the flowers in the latter species are included *within* the corolla, while those of the former species extend *beyond* the corolla. The fruit of the Sweet Buckeye has a smooth leathery covering, and its buds are not resinous, while the fruit of the Fetid Buckeye has prickly projections on the husk of the fruit, and its buds are somewhat resinous. These two closely related species may also be distinguished by the pronounced ill-smelling odor which is given from the crushed twigs of the Fetid Buckeye.

The wood is weak, soft, and whitish to yellowish in color. It weighs about twenty-seven pounds per cubic foot, and is used for lumber, veneer, slack cooperage, paper pulp, candy boxes, dishes, bowls, and artificial limbs.

I do love a good tree. There it stands so strong and sturdy, and yet so beautiful—a very type of the best sort of man. How proudly it lifts its bare head to the winter storms, and with what a full heart it rejoices when the spring was come again! How grand its voice is, too, when it talks with the wind; a thousand aeolian harps cannot equal the beauty of the sighing of a great tree in leaf. All day it points to the sunshine, and all night to the stars; and thus passionless, and yet full of life, it endures through the centuries—come storm, come shine—drawing its sustenance from the deep bosom of its mother earth, and, as the slow years roll by, learning the great mysteries of growth and decay. And so on and on through generations; outliving individuals, customs, dynasties—all save the landscape it adorns and human nature.—H. RIDER HAGGARD.

THE LINDEN FAMILY

TILIACEÆ

THE Linden Family comprises thirty-five different groups of plants with a total membership of about 375 different species. Only one group has three representatives in the United States. It is technically known as *Tilia*, and comprises the Basswoods and Lindens, of which we have eight different native species.

In addition to the native species, a number of European Lindens are planted rather extensively as park and street trees in America. They are the Small-leaved Linden (*Tilia parvifolia*) and the Large-leaved Linden (*Tilia grandifolia*). Both species are excellent trees and deserve to be planted for ornamental and shade purposes wherever possible.

Basswood

Tilia americana *Linnæus*

Family.—Linden.

Other Names.—Linden; Lime-tree; White wood; Beetree; Whistle-wood; Lynn.

General Description.—*Shape:* broad, ovoid or rounded. *Height:* 60 to 70, sometimes 120 feet. *Bark:* on twigs smooth, shiny, bright red; on young stems dark gray and smooth; on old trunks dark gray, roughened by vertical furrows. *Buds:* egg-shaped, stout, unsymmetrical, covered with about 3 visible bright red scales. *Leaves:* alternate, simple, egg-shaped to round, oblique and heart-shaped at base, sharp-toothed on margin, long-pointed at apex. *Leaf-scars:* large, conspicuous, contain few to many bundle-scars. *Flowers:* fragrant, yellowish-white, arranged in clusters borne on long slender stalks attached to a leafy bract.

Preferred Habitat.—Rich soils in bottom-lands, and moist, fertile mountain slopes. Usually mixed with other hardwoods.

Range.—New Brunswick to Manitoba, south to Georgia and eastern Texas.

The Basswood is one of the important forest trees of the United States. It yields valuable timber and bark, produces attractive and fragrant flowers, and furnishes satisfactory shade.

BASSWOOD

1 = A flowering branch with mature leaves; 2 = longitudinal section of a flower, slightly enlarged; 3 = a fruiting branch; 4 = a winter twig

In summer the large firm and unequally based leaves and the fragrant white flowers borne in small clusters on slender stalks attached to a winged bract are distinctive. The flowers attract thousands of bees which manufacture from them a distinct brand of Basswood Honey. In autumn the woody, nut-like fruit occurring in small clusters attached to a winged bract is a positive distinguishing characteristic. The attachment of the seeds to the winged bracts is nature's way of providing for the scattering of the seed. In winter the lop-sided bright red buds with only three exposed bud-scales, and the dark gray and vertically-fissured bark, are excellent means of identification. If one takes a twig, cuts a cross-section, and examines it closely, he will see dark funnel-shaped areas in the inner bark alternating with lighter areas. This characteristic is rarely mentioned in books, but it is one of the best distinguishing characteristics this tree has.

The wood is light, soft, light-brown to nearly white, and fine in texture. It weighs about twenty-eight pounds per cubic foot, and is used extensively for paper-pulp, cheap furniture, kegs, pails, barrel headings, berry boxes, and excelsior.

THE EBONY FAMILY

EBENACEÆ

THE Ebony Family has a large number of representatives in the tropics, but only a few members of it are found in temperate regions. Five different groups of trees and shrubs belong to this family, but only one of them has representatives in the United States. This one embraces the Persimmons, which are known under the scientific name of *Diospyros*.

Few people in the United States know that the Persimmons comprise 160 different species. This is probably due to their distribution, for only two species extend northward into the eastern United States, the remainder being found in the tropics, eastern and southwestern Asia, and the Mediterranean region. The real ebony of commerce is derived from a tree native to Ceylon and the East Indies.

PERSIMMON

1 = A branch with pistillate flowers; 2 = a branch with staminate flowers; 3 = a fruiting branch with mature leaves; 4 = a winter twig, natural size; 5 = section of a winter twig, enlarged

Persimmon

Diospyros virginiana *Linnæus*

Family.—Ebony.

Other Names.—Common Persimmon; Possumwood; Date Plum.

General Description.—*Shape:* trunk short and slender; crown broad-topped and high. *Height:* 25 to 50, sometimes 100 feet. *Bark:* dark brown to black, cinnamon-red, at bottoms of furrows, breaks up into squarish blocks. *Buds:* egg-shaped, 1/8 of an inch long, sharp-pointed, covered with 2 glossy dark-brown scales. *Leaves:* alternate, simple, oval, 4 to 6 inches long, dark green and shiny, entire on the margin. *Leaf-scars:* crescent-shaped, contain one prominent bundle-scar. *Flowers:* white, urn-shaped, arranged in small clusters, and appear about May or June. *Fruit:* a juicy, spherical, orange-colored berry, 1 to 1½ inch in diameter and containing 4 to 6 seeds.

Preferred Habitat.—Rich bottom-lands, but prefers light, sandy, well-drained soil.

Range.—New York and Pennsylvania, south to Florida, and westward to Iowa and Texas.

The Persimmon is one of the best known trees south of the Mason and Dixon line, and locally ventures northward into southern Pennsylvania, New Jersey, and New York. An isolated outpost occurs near New Haven, Connecticut.

The best way to fix the Persimmon tree indelibly in one's mind is to taste the unripe fruit. One of the delights of the boys of the South is to treat their friends from the North to a handful of apparently delicious local fruit, which in reality is extremely bitter and astringent. The fruit is a globular berry, about one and one-half inches in diameter, and pale orange red in color when ripe. The bitter taste disappears in late fall, and then the fruits are indeed delicious.

The simple entire-margined, deep-green leaves arranged alternately on the twigs are very distinctive in summer. During May and June the urn-shaped white flowers are usually present. The dark-brown to black bark, which breaks up into squarish blocks, is a sure means of identification at all seasons of the year. It is deep-furrowed, and distinctly cinnamon-red along the bottom of the furrows.

The wood of Persimmon is very heavy and hard, and is susceptible to a high polish. It weighs about fifty pounds per cubic foot, and is used for shuttles, billiard cues, mallets, parquet flooring, brush backs, and veneer.

WHITE ASH

2 = A branch with a cluster of staminate flowers and immature leaves; 3 = a mature compound leaf; 4 = a cluster of fruit; 5 = a winter twig; 6 = section of a winter twig, enlarged

THE OLIVE FAMILY

OLEACEÆ

THE Olive Family comprises over 500 representatives, which are distributed widely in temperate and tropical regions. It includes twenty-one different groups of trees and shrubs, some of which are valuable timber trees, while others are prized for ornamental purposes, or for the food which they yield.

The Common Olive Tree, cultivated in ancient times in Palestine and Syria, and now planted in commercial orchards so extensively in many of the warm parts of the world, belongs to this family. The common Lilacs and Privets, used widely for ornamentation and hedges, are also among its members.

The Ashes are the most important group of forest trees belonging to the Olive family. More than forty different species occur in the world, sixteen of which are native to North America. The two most important species of Ash in the world are the European Ash (*Fraxinus excelsior* L.) and our native White Ash. The former species has been planted extensively in the eastern United States for ornamental purposes.

White Ash

FRAXINUS AMERICANA *Linnæus*

FAMILY.—Olive.

OTHER NAMES.—American Ash; Ash; Canadian Ash.

GENERAL DESCRIPTION.—*Shape:* crown narrow, pyramidal; when grown in open, round-topped. *Height:* 70 to 80, sometimes 120 feet. *Bark:* grayish-brown, roughened by diamond-shaped fissures. *Buds:* egg-shaped, blunt-pointed, brown, covered with 2 to 3 pairs of visible scales. *Leaves:* opposite, compound with 5 to 9 leaflets; leaflets stalked and 3 to 5 inches long. *Leaf-scars:* semi-circular, notches on upper surface, con-

BLACK ASH

1 = Branch with staminate flowers; 2 = a panicle of pistillate flowers; 3 = a mature compound leaf; 4 = a cluster of fruit; 5 = a winter twig; 6 = section of a winter twig, enlarged

tain numerous bundle-scars arranged in a curved line. *Flowers:* appear about May before the leaves; pollen-bearing in clusters; seed-bearing in loose panicles. *Fruit:* a winged seed 1 to 2 inches long and maturing in September.

PREFERRED HABITAT.—Fertile, moist soil. Common in rich woods, along streams and in swamps.

RANGE.—Nova Scotia to Minnesota, and southward to Florida and Texas.

THE White Ash is the most beautiful, useful, and distinctive of all the American species of Ash. When covered with foliage it is graceful and attractive, and during winter its large size, broad form, erect physique, and stout branches are impressive characteristics.

It may be recognized at all seasons of the year by the bark on the trunk, which is broken up into diamond-shaped furrows. The smooth and stout twigs of the White Ash, which are flattened at their nodes and arranged opposite each other, are also helpful means of identification.

During summer the White Ash may be identified by its smooth opposite, compound leaves, with five to nine even stalked leaflets. In winter its blunt-pointed brown buds, arranged opposite each other on the smooth twigs, are distinctive.

The fruit ripens about September, but often hangs in clusters far into the winter. The individual seed resembles a grain of oats. At one end it tapers to a point, and is attached to the twigs by a thread-like stem; at the opposite end a narrow wing about twice the length of the seed is fastened. These wings assist the wind in scattering the seeds, and thus help nature in propagating the tree.

The wood is hard, strong, straight-grained and tough. It is an all-purpose wood, weighing 41 pounds per cubic foot, and used extensively for many essential purposes.

BLACK ASH

FRAXINUS NIGRA *Marshall*

FAMILY.—Olive.

OTHER NAMES.—Hoop Ash; Swamp Ash; Basket Ash; Brown Ash.

GENERAL DESCRIPTION.—*Shape:* slender, short trunk bearing narrow and shallow crown. *Height:* 60 to 80, sometimes 100 feet. *Bark:* thin, grayish, scaly, somewhat corky. *Buds:* terminal buds ovate, sharp-pointed, black; lateral buds almost as broad as long, blunt-pointed, black, closely appressed to twigs *Leaves:* opposite, compound, about 14 inches long, with 7 to 11 sessile leaflets. *Flowers:* appear about May before the leaves; occur in dense clusters or open panicles. *Fruit:* a winged seed (samara) 1 to 2 inches long and grouped in drooping clusters about 7 inches long.

PREFERRED HABITAT.—Cool, swampy situations.

RANGE.—Newfoundland to Manitoba; south to Delaware, Virginia, and Arkansas.

THE Black Ash is loaded down with a long list of common names. It is called Hoop Ash because it was used in pioneer days in the manufacture

Photo by U. S. Forest Service

Courtesy of "Indiana Trees"

BLUE ASH

of barrel hoops. The name Basket Ash was given to it because the Indians preferred it to all other kinds of wood in making baskets. The name Swamp Ash is very appropriate, for it is essentially a tree of swamps and flourishes best in the cooler sections of the country.

The Black Ash is recognized easily at any season of the year. In summer its opposite and compound leaves with 7 to 11 *stalkless* leaflets is a sure means of identification, for all other native Ash trees have leaflets with stalks. In winter it can be identified by its black, ovate and sharp-pointed buds. In autumn its seed with flat kernels and wings extending to the base of the seed are also distinctive. In addition to these seasonal features it may be recognized at all periods of the year by its slender form, clean trunk, shallow crown, and thin grayish bark which is soft and corky and not furrowed like that of the White Ash. On many trunks the bark is so soft and corky that it crumbles and becomes mealy if rubbed.

This tree is not recommendable for ornamental planting, for it does not thrive on dry situations, and like all other Ashes it leafs-out late in spring and sheds its foliage early in autumn.

Blue Ash

FRAXINUS QUADRANGULATA *Michaux*

FAMILY.—Olive.

GENERAL DESCRIPTION.—*Shape:* short trunk with slender crown of spreading branches. *Height:* 75 to 100, sometimes 115 feet. *Bark:* on old trunks light gray, separating in large plates usually curling up at sides; on branches light brown to ashy gray. *Buds:* opposite, dark reddish-brown, with 3 pairs of scales; terminal bud ¼ of an inch long, laterals shorter. *Leaves:* opposite, 8 to 12 inches long, compound with 7 to 11 leaflets; leaf-stalks more or less hairy. *Flowers:* appear before leaves in April or May, occur in small clusters along twigs. *Fruit:* a winged seed (samara) 1 to 2 inches long, about ½ of an inch wide, grouped in dense drooping clusters.

PREFERRED HABITAT.—Fertile limestone hills and rich lowlands.

RANGE.—Southern Ontario and Minnesota south to Tennessee, Alabama, and Arkansas.

THE Blue Ash is perhaps the easiest to identify of all the ashes native to the United States. It can be recognized at any season of the year by its four-angled twigs, which have four distinct ridges running lengthwise along the bark. This characteristic is not found in any other native Ash, and disappears as the branches become larger.

It has other specific characteristics that help one recognize it. In summer its inner bark, if mixed with water, shows a blue coloring. This blue coloring was formerly used as a dye and gave the tree the name "Blue Ash." In autumn and early winter its short, broad and winged

CATALPA

1 = A panicle of flowers; 2 = a branch with two drooping cigar-like fruits, the one split open showing the seeds; 3 = a winged seed; 4 = a winter twig

seeds, and in spring its small clusters of flowering occurring along the twigs, are helpful in recognizing it.

The Blue Ash is chiefly a native of the Mississippi Valley, where it grows commonly on uplands, such as fertile limestone hills, and reaches a height of more than 100 feet. It is an excellent tree for street and park planting.

THE BIGNONIA FAMILY

BIGNONIACEÆ

THE Bignonia Family is one of the largest with tree representatives in North America. It comprises 100 different groups of plants, with a total membership of over 1,500 different trees, shrubs, woody climbers, and a few herbs. Most of its representatives occur in the tropics, only a few being native to the United States.

The Catalpas are the most prominent members of this family in our flora. There are seven species of Catalpa in the world, and two of them—the Eastern Catalpa and the Western Catalpa—are among our native trees. Both produce attractive foliage, beautiful flowers, unique fruit, and yield decidedly durable wood.

Catalpa

Catalpa bignonoides *Walter*

Family.—Bignonia.

Other Names.—Eastern Catalpa; Indian Bean; Bean Tree; Cigar Tree; Indian Cigar Tree.

General Description.—*Shape:* broad, spreading and rather symmetrical. *Height:* 25 to 40, sometimes 60 feet. *Bark:* light-brown, bitter, rather thin, scaly. *Buds:* small, almost imbedded in bark of twigs. *Leaves:* large, opposite or whorled, simple, 6 to 10 inches long, 4 to 5 inches broad, entire or wavy on margin. *Leaf-scars:* large, elliptical in outline, with projecting margins; bundle-scars arranged in ellipse. *Flowers:* appear in June and July in large many-flowered panicles. *Fruit:* bean-like or cigar-like capsule containing many winged seeds.

Preferred Habitat.—Moist, fertile situations. Endures shaded conditions, and will grow on dry sites.

Range.—Original range within Georgia, Alabama, Mississippi, and Florida. Now found in all States east of Rocky Mountains, and as far north as New England.

BLACK HAW

1 = A branchlet with leaves and two cymes of flowers; 2 = a branchlet with leaves and two clusters of fruits; 3 = a winter twig with a large terminal flower-bud and three leaf-buds. Two leaf-buds are opposite, and located about the middle of the twig, while the third is at the base and to right of the terminal flower bud, natural size

By their flowers and fruits you may know the Catalpas. Next to the Horse-chestnut, the Catalpa bears the most showy flowers of any of our native or commonly introduced trees. When in blossoms, the trees are covered completely with panicles of flowers, which are often so numerous and so closely set that it is difficult to see the foliage behind them.

The fruit, which often persists far into winter, is an elongated capsule containing many small winged seeds. It resembles a long round bean or elongated cigar, whence its common names, Bean Tree and Cigar Tree.

In winter it may also be distinguished by its small buds, almost imbedded in the bark, and its large elliptic leaf-scars, which are opposite or whorled and contain an elliptic ring of bundle-scars. In summer the large ovate leaves are very distinctive. The common Eastern Catalpa closely resembles the Western Catalpa (*Catalpa speciosa* Warder), native to the middle western States. The former can be distinguished by its slenderer and thinner-walled fruit, larger flower clusters, more conspicuous markings on the inner surface of the corolla of each flower, and more blunt-pointed leaves. The western species suffers less from frost and produces straighter trunks than the eastern species.

THE VIBURNUM FAMILY

CAPRIFOLIACEÆ

Black Haw

VIBURNUM PRUNIFOLIUM *Linnæus*

FAMILY.—Honeysuckle.

OTHER NAMES.—Sweet Haw; Sheepberry; Stag-bush; Nannyberry.

GENERAL DESCRIPTION.—*Shape:* trunk short, often crooked, bearing a broad, round-topped crown. *Height:* 15 to 20, sometimes 35 feet, with a diameter of 10 to 12 inches. *Bark:* rough, reddish-brown, broken into thick plate-like scales. *Buds:* opposite, ¼ to ½ of an inch long, covered with rusty pubescent scales. Lateral buds flat and hug twig; flower buds swollen near base. *Leaves:* simple, oval, 1 to 3 inches long, finely serrate on margin, and leathery when old. *Flowers:* small, white, appear about May in dense, many-flowered stalkless cymes from 3 to 4 inches wide. *Fruit:* fleshy, sweet, and juicy, dark-blue drupe, grouped in reddish stalked clusters.

PREFERRED HABITAT.—Dry, rocky hillsides. Common along fences and roadsides, and occasional in moist locations.

RANGE.—Connecticut south to Georgia and west to Arkansas.

THERE are about one hundred different kinds of Viburnum in the world. Black Haw is one of them. Some of the other common kinds of Viburnum are the Sweet Viburnum, Maple-leaved Viburnum, and Hobble-Bush. They all belong to the Honeysuckle Family, of which the common Elderberry is also a member.

The Black Haw is a small tree, usually 10 to 15 feet high but occasionally reaches a height of 35 feet. Its leaves are about 2½ inches long, blunt-pointed, and finely-toothed on their margin. The best distinguishing characteristic of the Black Haw, present at all seasons of the year, is its stiff lateral branchlets, which stand out almost at right-angles to the main branches and the stem.

Its buds are also a helpful means of identification. They are arranged opposite each other, and are from ¼ to ½ of an inch long, and covered with two rusty, hairy scales. The lateral buds are about ¼ of an inch long, decidedly flattened, and hug the twigs closely. The flower buds are enlarged near the base.

The flowers are also a helpful means of identifying the Black Haw. They are small in size, white in color, and arranged in flat-topped clusters which are from 3 to 4 inches broad. It is not unusual to find small trees which are completely enveloped with white flowers during early May.

Blue Gum

Eucalyptus Globulus *Labill*

Family.—Eucalyptus.

General Description.—*Shape:* trees about 200 feet or less. *Bark:* grayish or bluish-white, smooth, except at base. *Leaves:* lanceolate, thick; calyx-tube and lid covered with bluish-white wax. *Flowers:* large, angular; attractive to bees.

Preferred Habitat.—California; extensively planted.

Range.—South; stands long drought without irrigation, in a region of only 8 or 10 inches annual rainfall.

All the Eucalyptus Family are natives of Australia. The genus contains upward of one hundred and forty species, but the one common to California is the Eucalyptus Globulus (blue gum).

While the Eucalyptus is not a native American tree, it has been grown so extensively in California and our island possessions that it deserves a brief mention here, for it has long since passed out of the speciality class and may now be found by the millions all over certain sections.

It is a very rapid-growing tree, often reaching two hundred feet in height and three feet in diameter at the base. The bark is grayish or blue white, smooth except in old trees at the base of the trunk, and sheds its bark in long ribbon-like strips almost continuously. The leaves are lanceolate and thick, hanging downward for the most part on slender branches, giving the tree the appearance of being covered with great bunches of feathers.

The young leaves yield eucalyptus oil, extensively used for medicinal

purposes. The bark yields a resin containing tannin in commercial quantities, and on account of this fact it is classed with the gum trees. It is being planted widely in malarial regions, and is proving very beneficial in that connection.

Its calyx is tube-like, lid covered with a bluish-white wax. The flowers are attractive to bees, but the nectar has a strong and unpleasant odor. It spreads rapidly by volunteer seedlings, and will stand protracted drought without irrigation.

In Australia, its timber is very widely used by ship-builders for planking and keels, also for fence rails, telegraph poles, and railroad ties, but in America it is used almost exclusively for decorative purposes, local wood supply, and wind-breaks. It is said that one-tenth of an acre of ten- to twelve-year-old trees will supply one family continuously with wood supply, for it will stand very severe pruning, and if cut at the end of the dry season when the sap is least active it may be cut completely off only to sprout vigorously again from the stump.

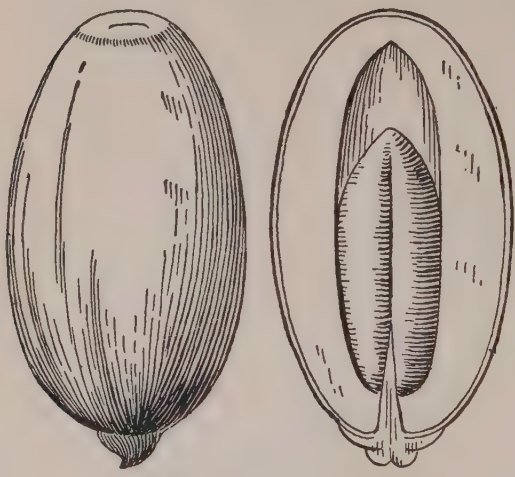
EUCALYPTUS

AMERICAN PALMS

PALMÆ (*Sargent*)

DATE PALM (*Phœnix dactylifera*).
COCOANUT PALM (*Cocus nucifera*).
PALMETTO PALM (*Labal palmetto*).
FAMILY.—Palm.
GENERAL DESCRIPTION.—*Shape:* trees growing by a simple terminal bud, with stems covered by a thick rind; occasionally stemless. *Leaves:* at top of stem, plaited in bud, fan-shaped or pinnate. *Flowers:* perfect or unisexual. *Fruit:* a drupe or berry.
PREFERRED HABITAT.—Florida.
RANGE.—California, Arizona, Texas, and Florida.

THE word Palm is a popular designation of one of the largest and most important families among the monocotyledons. There are upward of 1200 species of palms. They are essentially tropical in habitat, are highly ornamental, and many of them have a very great economic value. Their fruits, stems, and leaves are used in the extensive manufacture of more than 800 articles.



FRUIT OF DATE PALM

In America there are three common palms, many varieties of each of these being known. They are the DATE PALM, the COCOANUT PALM, and the PALMETTO PALM. They may be found through California, Arizona, southern Texas, and around the Gulf into Florida.

One of the notable characteristics of palms in general is their unbranching stems, the exceptions to this rule being very few. While these unbranched stems form a prominent feature in connection with this order of plants, yet great variations are found in size and habit, some members of the family towering up like slender marble shafts to a height of more than one hundred feet, and then terminating in a crown of magnificent

PALMETTO PALM

plume-like leaves, while others may be but three or four feet in height when fully developed, and show little or no trunk.

Hardiness in palms is a matter of size: smaller ones do not winter well while larger ones will winter readily. However, severe sun is as hard on the young plants as is frost. They are largely used for ornamentation and wind-breaks, and have no value whatever for wood, as the trunk is generally a fibrous, pithy growth that is very open and porous.

The foliage of the palms is of two chief kinds—the fan-veined leaves, in which the venation radiates from a common center, and the feather-veined, in which the veins run out from the sides of a long mid-rib, the leaf being frequently divided into long, narrow segments. Of the first group, the common Fan Palm, is an example, while the Date Palm and Cocoanut Palm are common examples of the feather-veined class.

The flowers in general are not especially attractive on any of the palms, either in size or color. Many of them are greenish-white or yellow, some orange and red. The interesting thing about them is the enormous quantities in which they are born, sometimes running up to the surprising number of a million or more.

The seeds of the palms also vary greatly as to size and shape, running from a pea-like seed to a cocoanut.

If interested in differentiating between the many genera and species of palms, a complete work on the subject should be consulted for general purposes. However, a knowledge of the three referred to will serve all practical purposes.

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